**ITS** *Intelligent Transportation Systems*
U.S. Department of Transportation

**NG9·1·1**

# Next Generation 9-1-1 (NG9-1-1) System Initiative

# Human Machine Interface Display Design Document

Washington, D.C.
January 2008

Version 1.0

## DOCUMENT CHANGE HISTORY

| Version Number | Date | Description |
|---|---|---|
| V0.1 | December 2007 | Draft Version |
| V1.0 | January 2008 | Final |

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# 1    INTRODUCTION

The purpose of this document is to describe the design for the human machine interface (HMI) display for the Next Generation 9-1-1 (NG9-1-1) System (or "system of systems") based on the initial Tier 1 requirements identified for the NG9-1-1 System.  The ubiquitous access to 9-1-1 emergency services needed in today's world of evolving technology is driving the need to introduce a broader array of interconnected networks that would comprehensively support emergency services.  The U.S. Department of Transportation (USDOT) is leading the effort to introduce the NG9-1-1 System, which is designed to improve management of emergency services throughout all aspects of operations, including public access to the emergency services; facilitation of services; and delivery of emergency information to public safety answering points (PSAP), emergency call centers (ECC), and first responders.

USDOT views the NG9-1-1 System as a necessary transition to enable the general public to make a 9-1-1 "call"[1] from any wired, wireless, or Internet Protocol (IP)-based device, and allow the emergency services community to take advantage of enhanced call delivery and advanced functional and operational capabilities through new internetworking[2] technologies based on open standards.  By enabling access to 9-1-1 services through virtually any communications device, the NG9-1-1 System provides a more direct ability to request help or share critical data from any location with emergency services providers.  In addition, call takers at the PSAPs will be able to transfer emergency calls to another PSAP and forward the location and other critical data, such as text messages, images, and video, with the call.

The HMI within the NG9-1-1 PSAPs will assist in consolidating and presenting emergency information received via IP, cellular, telematics, sensor, and public switched telephone network (PSTN) devices to the call taker in an efficient end-user format.  It will provide call takers with an interface to manage access to 9-1-1 requests for services received through virtually any communications device, provide a more direct ability to share critical data with emergency services providers from any location, transfer emergency calls to another PSAP, and forward the location and other critical data with the call.  The HMI is envisioned to improve call takers' efficiency and reduce time in responding to emergency calls.

This NG9-1-1 HMI Display Design Document presents a detailed description of the evolved HMI display that the call takers will use.  The display is being designed to support next generation technologies, access methods, and functional capabilities.  As a starting point, this document describes the NG9-1-1 call taker activities and call flows, followed by a detailed description of the HMI display, addressing the call taker operations within the next generation environment.  Key design considerations and

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[1] The term "call" is used in this document to indicate any real-time communication—voice, text, or video—between a person needing assistance and a PSAP call taker.
[2] "Internetwork"—to go between one network and another; a large network made up of a number of smaller networks.

supporting requirements are discussed to draw attention to the characteristics that are most important to the successful operation of the HMI display in the NG9-1-1 System.

## 1.1 Goals and Objectives

The purpose of this document is to provide detailed specifications for the HMI display design. These specifications are based on the Tier 1 requirements developed and defined in the *NG9-1-1 Concept of Operations and Detailed Design Specifications* document. It is understood that these requirements may change during the project and further detailed specifications may be developed. This document is intended as a starting point for vendors and the PSAP community to begin development of deployable systems when they begin to implement and operate in the NG9-1-1 compliant environment.

This document will be used as a basis for the Proof of Concept (POC) HMI software development, as a full-scale version of the HMI (compliant with the Tier 1 requirements) will not be developed for the POC. Appendix E of this document details features and components that will be designed and implemented for the POC demonstration.

The goal of the HMI Display Design Document is to provide an overview of the HMI display design in the context of the new features of the NG9-1-1 System and options for multimedia calls and interfaces. The objectives of the HMI Display Design Document are to—

- Develop HMI design specifications to allow for implementation at a PSAP (i.e., develop one or more call taker HMIs for the USDOT NG9-1-1 POC

- Provide a clear overview of functional capabilities and features of the HMI display in the NG9-1-1 environment

- Discuss the means by which call takers in the NG9-1-1 environment will be able to access and transfer calls, as well as share call data between PSAPs and other authorized emergency organizations

- Identify screen components, links, and functions of the HMI display, and identify their use by the call takers

- Indicate the use of legacy, computer aided dispatch (CAD), and mapping systems in the context of HMI

- Describe potential implementation considerations for the implementation of the HMI solution in PSAPs and NG9-1-1 operations.

## 1.2 Document Overview

This document contains the HMI display design functions, as well as a description of the suggested layout and components of the HMI screen. The remainder of this document is organized as follows:

- **Section 2—HMI Design Process Overview and Methodology:** Describes the approach taken to develop the HMI design and provides a high-level overview of activities that will take place during the development, implementation, and post-implementation phases.

- **Section 3—Overall HMI Design:** Describes the HMI design at a high-level relating it to specific call taker activities.

- **Section 4—HMI Display Design:** Provides a detailed description of the HMI display design, functionality, and layout.  This section also describes, at a high-level, design specifications and considerations.

- **Section 5—HMI Integration:** Identifies integration considerations (at a high-level) for HMI integration nationwide at the PSAPs, and for the purpose of the POC, as well as high-level interface requirements.

- **Appendix A: Acronyms:** Lists acronyms used in this document.

- **Appendix B: Glossary:** Defines terms used in this document.

- **Appendix C: Source References:** Provides a list of published documents that were referenced while developing this document.

- **Appendix D: Requirements Traceability Matrix:** Contains requirements descriptions and additional detail to map each derived Tier 1 requirement to the sections of this document. Its purpose is to ensure compliance of this document with the requirements.

- **Appendix E: HMI Design Specifications for POC Deployment:**  Details functionality and components of the HMI design that will be implemented for the POC.

- **Appendix F: Design Components:** contains descriptions of key fields used to illustrate the HMI components.

## 1.3 Target Audience

The NG9-1-1 HMI Display Design Document is a formal document that provides a user-oriented vision of the HMI display in the context of emergency services stakeholders.  The intended audience includes NG9-1-1 System project stakeholders, vendors, and other parties who will use the HMI display.  This document is intended to communicate the vision of the HMI display to these stakeholders so they can understand the functionality of this interface and provide foundational support for development and deployment of the HMI application in the NG9-1-1 environment.  The HMI design is developed based on the functional understanding of PSAP operations and Concept of Operations requirements identified for the NG9-1-1 System.

# 2    HMI DESIGN PROCESS AND METHODOLOGY

The HMI, within the NG9-1-1 PSAP, will assist in consolidating and presenting caller information received via new IP-based 9-1-1 communication channels while integrating the traditional information received from cellular and PSTN devices.  The display will present the data received to the call taker in an efficient format, maximizing the call taker's ability to understand and process the emergency request regardless of the communication channel through which it was received.  The HMI display is envisioned to improve call takers' efficiency and reduce time in responding to emergency calls.

The HMI display for the NG9-1-1 System should enhance the call takers' ability to process emergency calls, enabling them to assist in saving lives, ensuring health, and protecting property.  To ensure that the HMI display fulfills its function as an efficient interface between the call taker and NG9-1-1 System, the NG9-1-1 team used a rigorous development process.  This section provides an overview of the HMI display design methodology and processes.

## 2.1 Role of NG9-1-1 HMI Display

The NG9-1-1 System provides emergency communications access to a variety of new telecommunication devices.  As a result, the PSAP call taker may need to answer and process new means of communications and a variety of multimedia data (e.g., voice, text messages,[3] images, and video).  The NG9-1-1 HMI display will also provide linkages to supplemental or supportive data such as interactive maps, standard operating procedures (SOP), links to helpful hints, and interrogation questions to enhance the caller information.

The design of the NG9-1-1 HMI display is based on the key need for call takers to quickly and intuitively interpret the call data, make decisions about that data, and share data with appropriate entities as required.  Caller data will contain next generation media and content, provide access to an increased amount of information (essential, supplemental, and supportive data), and display access to various tools and databases.  The HMI display design takes into account the call taker's need to quickly and efficiently forward the call to the appropriate third party or responder while managing a screen that contains innovative communication types and tools.

The vision for the NG9-1-1 HMI display is to provide the foundation for public emergency service applications used by call takers to receive and process Enhanced 9-1-1 (E9-1-1) calls from a variety of communication devices.  Specifically, the NG9-1-1 HMI solution vision includes—

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[3] Text Messages used in the context of HMI include short message service (SMS), interactive text messages, as well as Instant Message chats.  Interactive text message service will be used to communicate with TTY/TDD callers.  Therefore, for the purpose of this HMI design, text message service will be considered "multimedia."

- Providing a "single point of access" for call takers to view all the essential data related to routing the call appropriately, as well as additional supportive and supplemental data.

- Supporting receipt and processing of 9-1-1 calls from a variety of origination devices, including voice, text, images, and video. The answering and processing of calls needs to be performed in a consistent way, regardless of the communication method or device used.

- Facilitating standardized call answering and processing, regardless of call type or communication method or device used (e.g., via scripted interrogation questions and resolution procedures/SOPs). In many cases today, interrogation questions and SOPs are available only in a printed format and not readily available to the call taker.

The purpose of the NG9-1-1 HMI display is to provide a single desktop platform that gives call takers and dispatchers a common frame of reference for information that can also be shared across all responder entities. The display will also allow unified access to different systems (legacy, mapping/location, case management, etc.), manage the next generation multimedia content, create composite and graphical user interface (GUI) screens across all views, and provide other performance-enhancing functions. To achieve these objectives, the HMI display must be designed to facilitate the call taker's processing of the emergency calls while minimizing response time.

The HMI display must enable the call taker to conduct emergency call processing activities, including receiving a 9-1-1 call, verifying the nature and location of the emergency, verifying the location of the call, and forwarding call-related data to the appropriate public safety dispatch center for response. Section 3.1 of this document summarizes specific call taker activities addressed by the NG9-1-1 HMI.

The HMI display will correlate data from disparate sources and databases, and selectively include data on the display based on the call content. To accommodate next generation multimedia information sources, the HMI display will include new functionality and screens that are not currently available, including—

- Screens to process a wide variety of communication types (telephone, text messages, images, and video)

- Interactive maps

- Automatic call management and telephony functions, such as call forwarding and transfer, and call conferencing tools

- Embedded links to supplementary materials, including interrogation questions, SOPs, help tools, and training materials, as well as other applications.

To streamline the call taker's call processing efforts, the HMI display will be organized in a clean, user-friendly manner, using available screen real estate, while providing quick access to the most commonly needed system features and applications.

Timely response to callers is the most critical aspect of emergency operations. Because call takers often respond to life-and-death situations and cannot afford to make any errors while handling 9-1-1 calls, a successful HMI design that is easy to use and navigate is critical to improving call takers' efficiency and accuracy in answering and processing 9-1-1 calls. The HMI display is being designed to fully address call taker needs for intuitive navigation through the application, provide adequate mapping and imaging features, and enable quick access to the frequently used features such as forwarding call information to dispatch agencies and emergency responders.

## 2.2 HMI Design Scope

The HMI Display Design Document is a detailed description of the components, features, and functions of the HMI display and the screen layout. Backend automated call distribution (ACD) rules and system requirements, as well as detailed call taker operations activities, are identified in the *NG9-1-1 System Description and Requirements Document*.[4]

This HMI Display Design Document also contains a Requirements Traceability Matrix (see Appendix D), which ensures that it addresses all of the Tier 1 requirements identified in the *NG9-1-1 System Description and Requirements Document*.

## 2.3 HMI Design Approach

The HMI display design process began with a high-level review of PSAP operations[5] and functional needs, followed by a detailed review of HMI business needs and layout considerations. NG9-1-1 System capabilities were evaluated to ensure that the HMI design would fulfill all of the system needs identified for it. The HMI design team[6] considered issues identified for the HMI design in the *HMI Human Factors Issues* document and also gathered information from the PSAP call takers and directors—all to support design of a robust HMI display that would facilitate the call taker's function when responding to emergency calls generated using next generation call origination devices. In summary, the HMI display was developed based on the identified needs and objectives of the call taker activities, NG9-1-1 system requirements and functional capabilities, as well as fulfillment of the User-Centered Design (UCD)[7] principles for user interface layout.

Three key phases, described in Figure 2.1, helped determine the end vision of the HMI Display—Assessment of HMI Display Needs and Requirements, Design of the HMI

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[4] USDOT ITS JPO. "NG9-1-1 Systems Description and Requirements Document," November 2007. http://www.its.dot.gov/ng911/ng911_pubs.htm (15 January 2008).

[5] PSAP operations evaluation and review was conducted through stakeholder involvement (including interviews and evaluation of draft materials). In addition, a review of a sample set of call taker software currently available in the marketplace was conducted. A high-level summary of the findings was presented in the HMI Human Factors Issues Report.

[6] The HMI display design team consists of public safety communications subject matter experts (SME) from L. Robert Kimball & Associates and the National Emergency Number Association (NENA), as well as Booz Allen Hamilton consulting staff.

[7] IBM. "User-Centered Design," http://www-03.ibm.com/easy/page/570 (15 January 2008).

Display, and Identification of HMI Design Considerations. Development and Post-Implementation activities, identified as the fourth phase in the HMI Design Approach, will begin after the design of the HMI display is complete.

**Figure 2.1—HMI Display Design Activities**



**HMI Display Design Activities**

**Assessment of HMI Display Needs & Requirements**

**Data Gathering, Interviews, Data Consolidation, & Analysis**

▸ Gather information related to NG9-1-1 technologies, and supporting customer service delivery processes, policies, and workflows from the NG9-1-1 existing documentation
▸ Conduct interviews and other data gathering activities with PSAP staff to identify potential additional needs and design considerations
▸ Identify system and business requirements from the NG9-1-1 Requirements listing
▸ Derive design characteristics from Call Taker needs and NG9-1-1 system requirements

**Design of the HMI Display**

**Design Sessions, Key HMI Components, HMI Design**

▸ Hold design sessions to identify components, functionality and layout of the HMI display
▸ Develop HMI display mock-up. Verify mock up with Subject Matter Experts (SMEs), and the Development Team
▸ Create Requirements Traceability Matrix (RTM) to ensure compliance of the HMI display with the NG9-1-1 system specifications
▸ Describe key components of the HMI display and provide a detailed description of HMI display key fields
▸ Draft HMI Display Design Document

During the implementation phase, feedback received from the development team will drive changes to the HMI Design. The cycle will continue until the final product is implemented

**Identification of HMI Design Considerations**

**Technical Considerations and Constraints, Architecture Review**

▸ Review NG9-1-1 infrastructure, systems applications and other architectural components from the NG9-1-1 deliverables
▸ Work with development team to evaluate potential constrains of the HMI display design
▸ Identify cross points between HMI display and the NG9-1-1 Architecture
▸ Document HMI Deployment Considerations and Constraints
  • Document the Design Considerations for the Industry
  • Document the Design Considerations for the POC sponsored by the USDOT

**HMI Display Post-Design Activities**

**POC HMI Development and Post-Implementation**

**Technology Architecture Blueprint / Business Case**

▸ Develop HMI Display for the POC, based on selected HMI Design specifications
▸ Conduct User Acceptance / User Verification tests
  • Develop test scripts based on HMI Display design
  • Conduct verification tests
  • Gather and document feedback from the user group and make changes to the HMI Display (if necessary)
▸ Finalize HMI Display Look & Feel and Functionality based on User Feedback
▸ Present POC HMI Display to the Client
▸ Develop HMI Display Training Documentation

## 2.4 Design Definition and Perspective

The HMI display design was developed based on the functional and operational needs of PSAP call takers. These needs were determined based on interviews with the PSAP staff conducted via questionnaires as well as telephone. In addition, a thorough review of NG9-1-1 System documentation (*Concept of Operations*, *Architecture Analysis*, and *System Description and Requirements* documents[8]) was conducted to identify system needs and operational components for the future HMI display.

The HMI design is driven from the perspective of the 9-1-1 call takers. It supports the need for call takers to quickly and intuitively interpret the caller data and make decisions based on that data and the call interrogation process. The HMI display is intended to maximize the call taker's efficient use of the screen, enhance his/her ability to process calls received via various multimedia sources, and forward calls and call data to the appropriate entity—all while using new and innovative controls to handle the 9-1-1 calls. At the same time, the HMI display must continue to enable the call taker to conduct call answering and processing activities, including receiving a 9-1-1 call, verifying the nature

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[8] USDOT ITS JPO. Next Generation 9-1-1 Publications and Presentations, http://www.its.dot.gov/ng911/ng911_pubs.htm (15 January 2008).

and location of the emergency, verifying the location of the call, sharing call-related data with the appropriate public safety dispatcher or entity for response, as well as functional activities related to call records management, geospatial visualization, and data management.

Key characteristics identified for the HMI display design include—

- Clear and meaningful presentation of information from the HMI display
- Efficient navigation through the HMI display via a navigation menu and intuitive information flow
- User-friendly HMI display layout, including text, images, and screen design
- Quick identification of the emergency location by the call taker and display of the location on the screen
- Intuitive identification of the emergency type by the call taker through a variety of tools and components, including embedded scripting and Short Message Service (SMS) translation tools
- Standardized placement and presentation of essential information and multimedia contents (such as text, image, and video), which use a standard set of controls to interact with the multimedia data (i.e., zoom functions)
- Similar presentation of essential, supplementary, and supporting information on the HMI display for all call types (text, image, video, voice, etc.)
- Quick access to reference, help, and training materials (SOPs, FAQs, etc.)
- Convenient and efficient process for automatic and electronic sharing of data with entities and emergency responders, minimizing the call taker's need to reenter data.

# 3 OVERALL HMI DESIGN

The HMI display for the NG9-1-1 environment is designed to support the call taker's need to quickly and intuitively interpret the call data and resolve the call as appropriate. The HMI display will enable call takers to conduct call answering and processing activities, as well as manipulate E9-1-1 data. These activities, described in Section 3.1 below, include receiving a 9-1-1 call, verifying the nature and location of the emergency, verifying the location of the call, sharing call-related data with the appropriate public safety dispatcher for response, and performing activities related to call records management, geospatial visualization, and data management.

The HMI display will provide call takers with access to all data relevant to routing the call appropriately. Call takers (at most PSAPs) receive a wide range of information that is categorized as essential, supporting, and supplementary. The NG9-1-1 System will maintain the information categories that are currently available and apply the categorization across calls received via all communication types. Table 3.1 describes the data categories and lists some examples for each.

### Table 3.1—NG9-1-1 Data Categories

| Category | Description | Examples |
|---|---|---|
| Essential Data | Information that supports the ability of call takers to deliver the call and provide adequate response capability. This information provides the ability to identify the location of the caller, the call origination device of the caller, and whether call back is possible. This essential data is automatically provided as a part of a traditional 9-1-1 call stream. | • Emergency location/address<br>• Telephone number<br>• Service provider of the device from which the call was received<br>• Name of the caller<br>• Any multimedia information (i.e., image of the intruder, video of a fire) if it is the only method of 9-1-1 communication |
| Supportive Data | Information beyond essential data that may support call handling and dispatch. The addition of this data to the call stream is triggered by one or more of the data or reference items in essential data for a given call type. | • ACN data such as "vehicle rollover"<br>• Images of a suspect or vehicle license plate, if a 9-1-1 voice call is received in addition to the image |
| Supplemental Data | Multimedia information that may complement, but is not necessary for, call handling and dispatch or emergency response. | • Images of damaged vehicle received in addition to the call for help<br>• Contact information for the patient that can be forwarded to emergency responders |

The HMI display will gather and display essential information (i.e., Caller Location, Phone Number, Subscriber Name, Service Provider, etc.) for each emergency call, regardless of the communication medium by which it is received (i.e., voice, text, image, video). In addition, presentation of the essential, supplementary, and supporting information on the HMI display will be standardized for all call types to facilitate the call taker's ability to recognize the nature of emergency and quickly forward the call for response as appropriate.

The following sections of the document provide an overview of functional activities, requirements addressed by the HMI design, and a user role discussion.

### 3.1 Call Taker Functional Activities

The HMI display will serve as an interface between the call takers and the NG9-1-1 components, and will enable call takers to receive and manage calls from the public. The HMI will support all of the call taker's routine activities, related to answering calls, identifying the nature of emergency, relaying the call to the appropriate entity, as well as tools that provide call takers with help in supporting daily operations, such as links to training materials, FAQs, and SOPs.

The end-to-end call flow shown in Figure 3-8 of the *NG9-1-1 System Description and Requirements Document* outlines functional activities that the call taker performs from the time a call has been initiated through its termination. The call flow describes the interaction of the call taker with the NG9-1-1 System and provides an overview of the processing of data during the duration of the call. The HMI display will enable the call taker to control and manage the call (and call data) received via the NG9-1-1 System and perform all of the call management tasks. The HMI display will also enable call takers to manipulate the system via commands and inputs, and receive an output from the system based on specified criteria.

Specifically, the HMI screen will enable call takers to perform the following call management tasks:

- Call Answering activities, which enable call takers to manage call queues, answer an incoming call, and perform a call back if the caller was disconnected

- Call Processing activities, which allow call takers to determine the nature of the emergency; determine the caller and emergency locations; select appropriate responders based on the nature and location of the emergency; provide pre-arrival instructions or other information to the caller; and establish conferencing among the call taker, caller, and third-party (e.g., telematics) service providers or appropriate public safety entities

- Call Records Management activities, which allow call takers to preserve a record of communication, obtain supportive or supplemental data from the call, and share call data with a third party, and transfer and terminate the call

- Geospatial Visualization activities, which allow call takers to view the 9-1-1 call location and geospatial information on a map, as well as update the map with the new call location and geospatial information

- Data Management activities, which allow call takers to submit caller information error report to the originating data provider for correction and generate a call record.

Because these activities have been previously described in detail in Section 5 (9-1-1 PSAP Operations Segment) of the *NG9-1-1 Systems Description and Requirements*

*Document*, this section provides a summary of the selected functional activities, use cases, and associated data needs.

### 3.1.1  Call Answering

Call Answering activities include all activities conducted by a call taker to receive and answer a call.  The HMI display will provide call takers with the ability to answer an incoming call, manage the call queue, and initiate a call back, if needed.  The call taker is the primary role involved in the execution of these activities using the HMI display controls.  Table 3.2 provides an overview of the activities, goals, HMI functional capabilities, and data needs for the Call Answering process.

**Table 3.2—Overview of Call Answering Activities**

| Activity | POC Number | Goal | HMI Functional Capabilities | Data Needs |
|---|---|---|---|---|
| Manage Call Queue | CA-MNQUE | Provide the capability to manage call queues and deliver the 9-1-1 call to a call taker workstation | • The call taker can view a call queue map to identify the geographical location of a call and identify call clusters<br>• The call taker can select a call outside of a cluster of calls of possibly related events to prioritize handling of a call relating to a potentially different emergency<br>• The call taker is alerted of the incoming call and the display presents the call taker with the essential and supportive call data | • Call Stream<br>• ACD Rules<br>• Call Detail Record<br>• Geographic Information System (GIS) Display Rules<br>• Geospatial Information<br>• Status Record |
| Answer Call | CA-ANSCL | Provide the capability to answer incoming a 9-1-1- call | • The call taker can answer an incoming call in response to an audible and/or visual indicator<br>• The call taker can place a caller on hold.  The system generates user alerts if the caller has been on hold longer than a predetermined threshold time | • Call Detail Record<br>• Call Handling Procedures |
| Initiate Call Back | CA-INTCB | Establish communications circuit between call taker and receiving party | • The call taker can initiate a call back for an abandoned, hung-up, or disconnected call<br>• The call taker can use established standards and operational best practices if the connection cannot be reestablished<br>• The call taker can initiate call back to a device other than the originating call device, such as to a service provider or third-party call center | • Call Detail Record<br>• ACD Rules/Call Queue Record |

Detailed information regarding Call Answering activities, including call flows, specific process inputs and outputs, data needs, and requirements, are listed in Section 5.1 (Call Answering) of the *NG9-1-1 System Description and Requirements Document*.  Call Answering requirements related to the HMI display and how they are addressed in this document are listed in Appendix D of this document—Requirements Traceability Matrix.

### 3.1.2  Call Processing

Call Processing activities are performed by a call taker to determine the nature of emergency in order to efficiently resolve the issue presented by the caller (by sending the call to an appropriate entity or responder, terminating the call, or transferring the call to a third party).  That determination is made on the basis of protocol, training and experience, and intelligence acquired from incoming data and interrogation of the caller. The HMI display will display all essential and supporting data, facilitating the ability of the call taker to quickly identify the nature of emergency and process the call. Furthermore, the display will contain embedded scripting, call handling SOPs, and links to supporting information to enhance the call taker's ability to obtain answers to essential questions and forward the call to an appropriate response agency.  Table 3.3 provides Call Processing activities, goals, HMI functional capabilities, and data needs.

**Table 3.3—Overview of Call Processing Activities**

| Activity | POC Number | Goal | HMI Functional Capabilities | Data Needs |
|---|---|---|---|---|
| Determine Nature of the Emergency | CP-DTNAT | Determine the nature of the emergency and provide an initial assessment of the situation | • The call taker can determine the nature of emergency via analysis of data provided from the HMI display to route the caller to the proper person or agency, or to dispatch the proper emergency response<br>• The call taker can interrogate the caller using scripting and SOPs features of the display<br>• The call taker can enter notes and comments associated with the call, and add the notes to the call record | • Caller Location<br>• GIS<br>• Emergency Location<br>• Verifying Location Display Rules |
| Determine and Verify Location of the Emergency | CP-VFLOC | Determine whether an emergency is located at the caller's location or elsewhere. Ensure responders are directed to the correct location | • The call taker can verify the emergency location information (presented on the display) and/or determine the location of the emergency<br>• The call taker can document the emergency location (if different from caller location<br>• The call taker can update incorrect automatic location information (ALI) | • Nature of Emergency<br>• Call Handling SOPs<br>• List of Potential Natures<br>• Additional Interrogation Information<br>• Geographic Call Locations<br>• Call Status |
| Update Mobile Caller's Location Information | CP-UCLOC | Receive location information for mobile callers | • The call taker can request more accurate or updated location information for a mobile caller via an update feature<br>• The call taker can monitor the change in a mobile caller's location through successive update requests<br>• The call taker can view all location information by viewing call record and additional addresses | • Rebidding Rules<br>• Call Detail Record<br>• Display Rules<br>• Caller Location Details |

| Activity | POC Number | Goal | HMI Functional Capabilities | Data Needs |
|---|---|---|---|---|
| Identify Appropriate Responding Agency or Service | CP-IDRES | Select appropriate responders based on the nature and location of the emergency, incident management procedures, and SOPs | • The call taker can identify appropriate responding agencies for the emergency location (or, if unavailable, caller location) of the call<br>• The call taker can view detailed information about each response agency<br>• The call taker can select the appropriate responder from the responder's list and transmit the information to the dispatchers for the responding agencies selected | • Emergency Location<br>• Responding Agencies<br>• Business Rules<br>• Call Type/Call Handling Procedures<br>• Nature of Emergency<br>• Displayed Agencies |
| Provide Pre-Arrival Instructions to Caller | CP-PRINS | Provide appropriate pre-arrival instructions to call taker. A call taker may distribute pre-arrival instructions to a caller as necessary | • The call taker can view script and/or pre-arrival instructions from the HMI display and deliver the scripted information to the caller<br>• The call taker can select from the list of presented instructions or searches for additional instructions<br>• The call taker can distribute the instructions/scripts, as appropriate (to third parties, dispatch agencies, etc.)<br>• The call taker can present the instructions to the caller without voice contact | • Nature of Emergency<br>• Call Handling SOPs<br>• Additional Interrogation Information |
| Establish Conference Call | CP-ECONF | Establish communication among the call taker, caller, third-party (e.g., telematics) service provider, and appropriate public safety entities | • The call taker can initiate a call transfer via telephone controls<br>• The call taker can establish a video, text, or voice conference session via the multimedia screen display<br>• The call taker can stay in conference with the caller while informing the dispatcher of the need to mobilize responders and provide updated information to the dispatcher | • Call Detail Record<br>• ACD Rules/ Call Queue Record |

Detailed information regarding Call Processing activities, including call flows, specific process inputs and outputs, data needs, and requirements, are listed in Section 5.2 (Call Processing) of the *NG9-1-1 System Description and Requirements Document*. Call Processing requirements related to the HMI display and how they are addressed in this document are listed in Appendix D of this document—Requirements Traceability Matrix.

### 3.1.3  Call Records Management

Call Records Management activities performed by call takers include capabilities and activities needed for creating, logging, archiving, retrieving, and transmitting Call Records. The HMI display will accommodate call takers in managing, viewing, and updating call records. Table 3.4 provides Call Processing activities, goals, HMI functional capabilities, and data needs.

**Table 3.4—Overview of Call Records Management Activities**

| Activity | POC Number | Goal | HMI Functional Capabilities | Data Needs |
|---|---|---|---|---|
| Record Call | CR-RCCAL | Preserve a detailed record of the interactive communications occurring during a call | • The call taker can access/retrieve the most recent call recording records from the HMI display via the ACD section. Recording is automatically initiated when a call is placed in the call queue<br>• The call taker can listen to the recent call recording and use standard multimedia controls (i.e., volume, brightness)<br>• The call taker can search for a recording from the call recording queue<br>• The call taker can retrieve a call recordings during a call session | • Real-Time Interactive Communication<br>• Record Interactive Communication<br>• Retrieve Call Recording<br>• Call Detail Record |
| Obtain Supportive of Supplemental Data Post Call Delivery | CR-OSSDT | Obtain supportive or supplemental data after call delivery to facilitate call processing | • The call taker can access supportive or supplemental data at any time during the call from the HMI display<br>• The call taker can perform query searches to locate necessary data from a variety of sources (external, or internal CAD)<br>• The call taker can search supportive or supplemental databases. The data can be displayed on a map, as a three-dimensional rendering, or as photographic imagery from the map and multimedia displays | • Supportive/ Supplemental Data<br>• Call Detail Record<br>• Medical History Data<br>• GIS |
| End Call | CR-ENDCL | Terminate existing call and return to ready to accept next call | • The call taker can end a call using the telephone control displays. The call taker will terminate the call only when it is safe to do so | • ACD Rules/Call Queue Record |
| Transfer Call | CR-TRCIN | Transfer all Essential, Supportive, Supplemental, and/or manually entered data concerning the call to the appropriate responding agency dispatch or other authorized entity | • The call taker can electronically transfer or forward call records to other call takers, dispatchers, responders, or other authorized entities with or without a simultaneous conference call<br>• The call taker can share call data with the selected third party | • ACD Rules/Call Queue Record<br>• Permission Rules<br>• Transfer Protocols/Data<br>• Record of Transmission Success/Failure |

Details regarding Call Records Management activities, including call flows, specific process inputs and outputs, data needs, and requirements, are listed in Section 5.3 (Call Records Management) of the *NG9-1-1 System Description and Requirements Document*. Call Records Management requirements related to the HMI display and how they are addressed by this document are listed in Appendix D of this document—Requirements Traceability Matrix.

### 3.1.4 Geospatial Visualization

The call taker will be able to perform Geospatial Visualization (GV) activities using the HMI display and supporting mapping display in order to visualize and analyze call information on a map.  Table 3.5 provides GV, goals, HMI functional capabilities, and data needs.

**Table 3.5—Overview of Geospatial Visualization Activities**

| Activity | POC Number | Goal | HMI Functional Capabilities | Data Needs |
|---|---|---|---|---|
| Display Geospatial Visualization | GV-DSGEO | Display location and geospatial information on a map | • The call taker can view basic geographic information via a graphical interface that displays data geospatially on a map. Basic GIS functions, such as zoom and pan, are supported<br>• The call taker can save data displayed within the graphical interface to the Call Record as a shape file for use at a later time<br>• The call taker can view all geospatial data stored in the system, including geospatial reference baseline object footprints, image footprints, and map feature data, as a set of objects rendered on the map display | • Caller Location<br>• Geographic Call Locations<br>• Emergency Location<br>• Verifying Location Display Rules<br>• GIS Display Rules<br>• Geospatial Information |
| Manipulate Geospatial Data | GV-MPGEO | Manipulate location and geospatial information | • The call taker can graphically specify query parameters, including polygon, rectangle, circle, ellipse, and point, and manipulate data on the map display<br>• The call taker can define bounding box(es) on a map as the initial criteria for a search<br>• The call taker can save data manipulated within the graphical interface to the Call Record as a shape file for use at a later time<br>• The call taker can gather information to enable the distribution of emergency notification services | • GIS Display Rules<br>• Geospatial Information |

Details regarding GV activities, including call flows, specific process inputs and outputs, data needs, and requirements, are listed in Section 5.4 (Geospatial Visualization) of the *NG9-1-1 System Description and Requirements Document*.  Requirements for the HMI display related to GV and how they are addressed in this document are listed in Appendix D of this document—Requirements Traceability Matrix.

### 3.1.5 Data Management

The Data Management activity, which allows call takers to document incorrect caller information and automate the reporting and tracking of the information so it can be corrected in the source data, will be available directly from the HMI display.  If a call taker identifies data errors, he/she will be able to report the error to the originating organization (i.e., service provider) from selected HMI display sections.  Table 3.6

identifies the Data Management activity, its goal, associated HMI functional capabilities, and data needs.

**Table 3.6—Overview of the Data Management Activity**

| Activity | POC Number | Goal | HMI Functional Capabilities | Data Needs |
|---|---|---|---|---|
| Submit Caller Information Error Report | DM-SCIER | Submit caller information error report to the originating data provider for correction. | • The call taker can document incorrect caller information (i.e., erroneous location associated with an IP address) and forward the request for error correction to the data source | • ACD Rules/ Call Queue Record<br>• Call Detail Record<br>• ACD Rules/ Call Queue |

Details regarding the Data Management activity, including activity specific process inputs and outputs, data needs, and requirements, are listed in Section 6 (Data Management) of the *NG9-1-1 System Description and Requirements Document*. Requirements for the HMI display related to Data Management and how they are addressed by this document are listed in Appendix D of this document—Requirements Traceability Matrix.

## 3.2 HMI Requirements

The HMI Display Design Document adheres to requirements standards and classifications identified in Section 4 of the *NG9-1-1 System Description and Requirements Document*, which presents NG9-1-1 System requirements within enterprise segments, listing service areas and functional activities for each segment. These functional activities are then further decomposed to identify the system requirements necessary to provide the activity. Functional activities are also supported by the Multidimensional Requirements Views (MRV), which are used to conceptually describe the activity from the user's perspective while simultaneously determining the requirements to be implemented by developers.

The design of the HMI display is based on requirements and system definitions identified in the *NG9-1-1 System Description and Requirements Document* and the MRVs. These documents align functional activities of call takers with specific system requirements and provide a detailed analysis of each prioritized activity by evaluating interactions or behaviors across the layers of architecture. The HMI display will be used as a communication device between call takers and the NG9-1-1 System—the call taker will use the HMI display to request a particular action, triggering an action in the NG9-1-1 System that results in an output from the system based on specified criteria. Requirements identified for the HMI display are generally related to managing call data, display features, and functionality, as well as multimedia data processing.

All Tier 1 system, data, and functional requirements, for the HMI display were extracted from the Requirements Repository. Each HMI display screen description identifies key requirements that were used to create that screen. Requirements Traceability Matrix (Appendix D) contains all extracted requirements and the HMI display design document

section in which they are addressed.  In this document, requirements descriptions contain—

- Service Area Code: Code to indicate a contextual grouping of like functional activities enabled by the system
- Activity Code: Unique code used to identify the Activity name and its associated service area name
- Role: A name of the job role of the person or the functional role of a technology that performs the Activity
- Requirement Code:  Tracking number for each requirement
- Requirement Text: Specific requirement statement.

The Requirements Traceability Matrix, presented as Appendix D of this document, ensures compliance of this document with the derived Tier 1 requirements. The matrix contains requirements descriptions and provides additional detail for each, in order to map the requirement to the document sections.

### 3.3 User Roles Within NG9-1-1 and HMI Display

Call takers will be assigned to perform a variety of roles in the NG9-1-1 System.  Role descriptions and overviews are provided in Table 2-1 of the *NG9-1-1 System Description and Requirements Document*.  Furthermore, each PSAP has its own organizational structure and role definitions, which dictate system access based on role descriptions.

Individual PSAP locations will be able to customize access restrictions to the HMI display, based on the local rules and regulations.  This document assumes unrestricted access to HMI display components by all NG9-1-1 roles and does not contain a discussion of access restrictions.  Moreover, this document does not include a discussion of the user login/authentication process because it is unique at each PSAP location.  At this point, the HMI design team is not able to determine whether a single sign-on structure will be in place for HMI and legacy systems or whether the systems will maintain their individual login procedures.

## 4    HMI DISPLAY DESIGN

The NG9-1-1 System will introduce a large quantity and new types of information that may be available to the call takers and/or to others as part of call processing. This next generation media and content, as well as the display of additional tools and databases, will all be accessible from the HMI display.  The display will contain new NG9-1-1 features and components capable of performing a variety of services to support call taker operations while maintaining efficient access to information and tools.  The HMI display is designed to provide call takers with the following key benefits:

- Facilitation of data management through consistent data processing and management procedures
- Ability to interpret multimedia data messages by using embedded scripting, SOPs, and help tools
- Improved capability to process the call by identifying emergency issues
- Standardization of the HMI layout and consistent presentation of data from the display, regardless of the type of call received (voice, multimedia)
- Intuitive navigation through the easy-to-navigate HMI display, reducing keystrokes and call taker decision time.

This section of the document details layout, functionality, and components of the main HMI display (referred to hereafter as the Main HMI Console) and all of its sub-components.  The design assumes that at least two physical hardware displays will be used at each call taker position—the Main HMI Console and the Mapping Display.[9]  The HMI Main Console presents all multimedia data received during a call; however, that section of the screen may be too small for the call taker to adequately view the multimedia information stream.  Reducing the physical number of monitors would likely result in an increase in the number of steps to perform a single action (e.g., switching applications, maximizing windows, etc.) and a reduction in a call taker's ease of use. Therefore, it is suggested that a third stand-alone display—Multimedia Display—should be used to view the multimedia data in full size.  The HMI design assumes that CAD and other legacy system displays will continue to be used by PSAPs.  Selected information from these legacy systems will be fully integrated into the fields of the HMI Main Console when appropriate; however, these systems would not be directly accessed by the user from the HMI Main Console during the call.  As needed, the legacy systems might be accessed from a different screen or from the HMI console after the call has ended.

The HMI Display is being designed with the ability to support both standard and touch-screen monitors.  Standard monitors are controlled from the terminal keyboard via key strokes and movements of the mouse.  Touch-screen monitors allow the user to use the display as the primary input device (rather than a mouse or keyboard) by directly tapping

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[9] Many PSAPs currently employ a separate monitor to display the mapping application, ensuring that call takers are able to obtain a clear geographical understanding of the emergency location.  It is assumed that once the HMI is implemented, the mapping display will remain separate and will be integrated with the HMI and supporting NG9-1-1 tools.

graphical elements on the screen. Standard monitors are currently the most commonly used at PSAPs. However, the increasing popularity of touch-screen monitors, because of their ability to provide improved application control and intuitive interfaces, suggests that they may become more commonly used at PSAPs.

The HMI display includes a variety of display objects, including large buttons, tabs, drop-down menus, and a keypad, allowing call takers to rapidly manipulate data and minimize their need to manually enter information. The HMI display design is easily translated into a touch-screen monitor, through which call takers will be able to intuitively interact with the NG9-1-1 system by simply touching the desired functionality instead of executing a keyboard command.

Section 4.1, Main HMI Console, provides a comprehensive view of the HMI display, describing common system features and display sections. It also provides an indication of how 9-1-1 calls are received, processed, and shared by a PSAP call taker.

The HMI display will integrate with most screens and systems that are used at the PSAPs. HMI User Interface design activities are expected both to take advantage of legacy systems (CAD, mapping) and to expand the desktop's capabilities through incorporation of inherent NG9-1-1 functionality. Furthermore, the display will provide a list of appropriate receiving (responding) agencies, such as Police/Fire/and Emergency Medical Services (EMS), that have the quickest response time to the emergency location.

Sub-sections 4.2 through 4.5 describe HMI display sub-sections and their key components. In addition, the interfaces between these components and data needs are addressed. Key system requirements are listed at the end of each sub-section to further detail the functionality for each screen. Sections 4.6 and 4.7 address the Multimedia Display and the Addition Information Display, respectively. The Map Display is discussed in Section 4.8. Finally, Section 4.9 provides interface, software, and hardware specifications for the HMI as a whole.

The HMI will be configurable to assist individuals who have difficulty distinguishing between standard color shades.[10] By using textual and visual references in addition to color, the HMI will allow these users to determine the status of the call (e.g., incoming call, held call, more information, and/or active call). The HMI display design provides for the ability to receive, use, and manipulate information and operate controls necessary to access and use information technology by visual enhancement or non-visual means. Examples of equivalent access include screen enlargement, magnification software, keyboard controls used for input and synthesized speech, Braille, or other audible or tactile means used for output. Appropriate configuration will be determined by each of the PSAP locations; however, for the purpose of the POC, alerts will be generated via a flashing button and a change in the text displayed on the button face.

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[10] The inability to distinguish shades of color is commonly referred to as color blindness or color vision deficiency.

Appendix F, Design Components, contains descriptions and rules of fields used to illustrate the HMI design screen.

## 4.1 Main HMI Console

The Main HMI Console is the main display used by call takers to answer, respond to, and manage calls.  The console allows call takers to view essential and supplementary data associated with each call.  The console also provides call takers with quick access to tools to effectively process calls, such as embedded interrogation questions, scripting, and emergency response procedures.  Call takers will be able to share all of the data obtained during the call with third parties and responder agencies directly from the main console.  The screen contains a listing of appropriate agencies that are selected based on the type and location of the emergency situation.  The Main Console is designed to minimize the time needed to access data and execute commands.  The console will allow call takers to access most applications with a single click or keystroke.

The Main HMI Console is divided into four sections, as well as two areas for Pop-Up displays.  The four sections are Caller Information, Emergency Information, Telephone Controls, and Call Taker Helpful Hints. The Multimedia Display (Pop-Up Section 1) is dedicated specifically for multimedia data, including Teletypewriter/ Telecommunications Device for the Deaf (TTY/TDD), text messaging, video and interactive video, and image displays.  The Additional Information Display (Pop-Up Section 2) is dedicated for all other supporting and supplemental data as well as call taker tools.  The Additional Information Display includes features such as embedded scripting, Responding Agency Detail, SOPs, Call Record, and, Call Recording, as well as other necessary identified Pop-Up sections.  The Pop-Up screens use tab functionality, enabling the call taker to have multiple screens open simultaneously and switch between the screens using the tabs.  For clarity, the active Pop-Up screen is highlighted to indicate the information the call taker is viewing.  Table 4.1 describes the Main HMI Console sections and Pop-Up message screens.

**Table 4.1—Main HMI Console Sections and Pop-Up Message Screens**

| HMI Display Section | Description |
|---|---|
| Caller Information Section | Provides caller's location and contact information.  The section fields are pre-populated based on the incoming NG9-1-1 call data and are immediately available to the call taker at the time of response.  Call takers can update the caller's location and contact information; however, the screen is primarily a read-only area. The main sub-screen has the information on the caller, including contact and location information. |
| Emergency Information Section | Enables the call taker to enter information about the emergency, including emergency location and emergency type.  The location of the emergency is pre-populated with information extracted from the Caller Information section; however, the call taker can change this data if the emergency location is different from the caller's location.  The call taker can enter notes regarding the emergency and view the nearest Responding Agencies. |

| HMI Display Section | Description |
|---|---|
| Telephone Controls Section/ ACD Display | Allows the call taker to answer, release, and transfer calls. It provides the capability to put the caller on hold, as well as view available lines. Call takers can also contact common agencies using the speed dial keys.<br>The ACD section allows call takers to view information regarding the call, including call time, duration, and time on hold. Call takers can change their status in ACD via a drop-down menu, as well as access call queue, call record, and call recording displays. |
| Call Taker Helpful Links Section | Contains helpful links to documents and websites that are generally not needed at the time of the call. Because of the amount of information they contain, the links open in a new window on the display or in a Secondary Multimedia display (if it is available at the PSAP). Links include General SOPs, Training Materials, Links to a Query screen, and a Response Agency Listing. |
| Multimedia Displays (Pop-Up Section 1) | Displays messages received exclusively via Multimedia data types. The area is sized to display one Pop-Up over another and may be populated with a number of Pop-Ups, accessible via tabs. The active tab is highlighted in green. Deactivated tabs are grayed out. The call taker can switch between multimedia tabs using a single click. |
| Additional Information Display (Pop-Up Section 2) | Displays any additional information for related to Pop-Ups. This will include Supplementary and Supporting data, Caller History, Additional Addresses, Additional Call Data, Telematics Information, Scripting, Response Agencies' details and listing, SOPs, Helpful Links, and other "Additional Information" displays identified for the HMI. The area is sized to display one Pop-Up over another and may be populated with a number of Pop-Ups, accessible via tabs. The active tab is highlighted in green. Deactivated tabs are grayed out. The call taker can switch between multimedia tabs using a single click. |

The following sub-sections (4.2–4.7) of this document specify details regarding components, features, and functionality of each section.

An incoming call will be automatically forwarded to the available call taker (whose ACD status is set to "Available"). To alert the call taker of an incoming call, the entire HMI Main Console will flash and provide an audible warning. The call taker will be automatically connected to the caller, and, upon call initiation, the Caller Information section will be pre-populated with call stream data. Figure 4.1 describes the flow of information of the HMI screen depending on the call type.

**Figure 4.1—HMI Flow Chart**
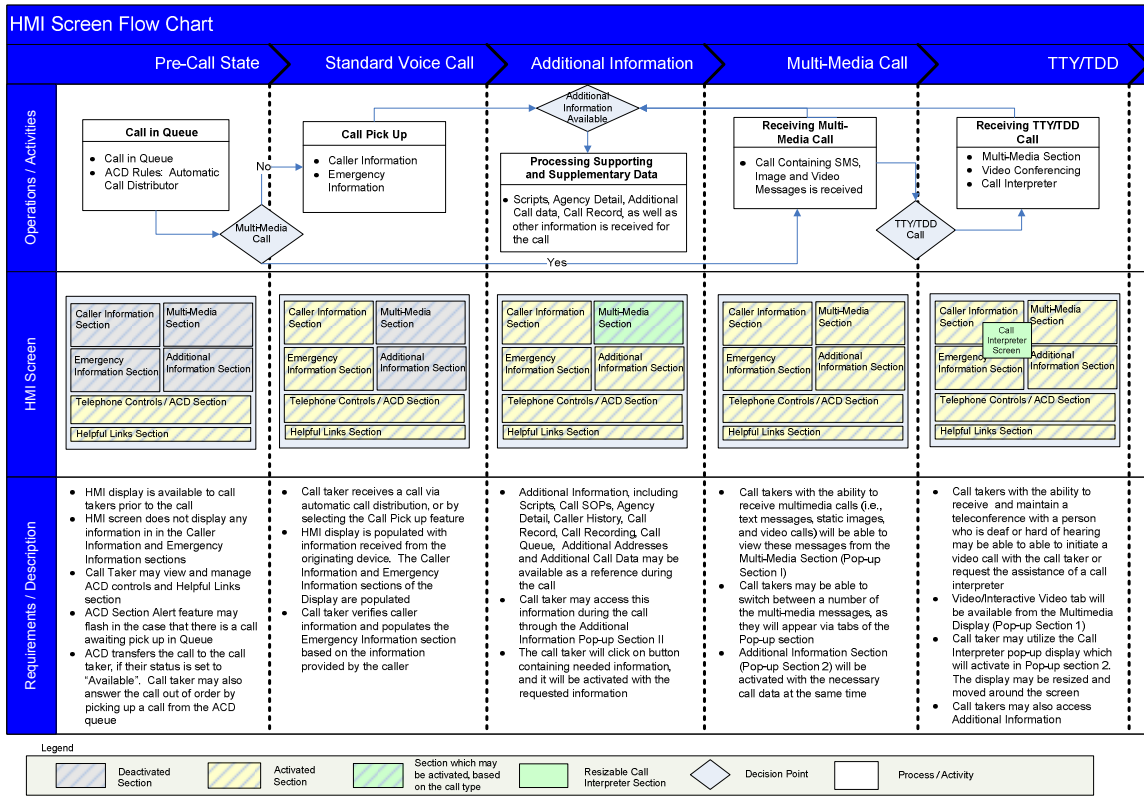


The remainder of the current sub-section describes the HMI display layouts the call taker would see in the following scenarios:

1. Standard Voice Call (Multimedia and Additional Information tabs are deactivated)
2. Standard Voice Call (with Additional Information tab activated)
3. Multimedia Call (with Multimedia and Additional Information tabs activated)
4. TTY/TDD Call.

### 4.1.1  Standard Voice Call (Multimedia and Additional Information Tabs Are Deactivated)

Initially the Additional Information (Pop-Up Section 2) of the display will be unpopulated.  If the call is not accompanied by any multimedia data, the Multimedia Display (Pop-Up Section 1) will also remain blank.  Figure 4.2 shows the HMI Main Console with both Pop-Up sections deactivated.

Call takers will automatically receive a call if their status is set to "Available" based on ACD rules.  Call takers may also pick up a call from the Call Queue section.  The Alert feature of the ACD display will flash and generate an audio alert to notify call takers of a call that has been waiting in the queue for longer than necessary.

Each of the sections of the HMI Main Console and their related functionality, including Caller Information, Emergency Information, Telephone Controls and ACD Display, Helpful Links, as well as both of the Pop-Up sections, will be described in detail in the following sections of the document.

The display is designed to fit on a standard PSAP monitor (see Section 5.1.3 of this document for hardware specifications); therefore, all of the features, including selection buttons and telephone controls, will be easily viewed and accessed by call takers. However, if, during the testing phase, it becomes apparent that some of the functions are too small or not easily accessible, the design will be modified to ensure efficient navigation and usability of the display.

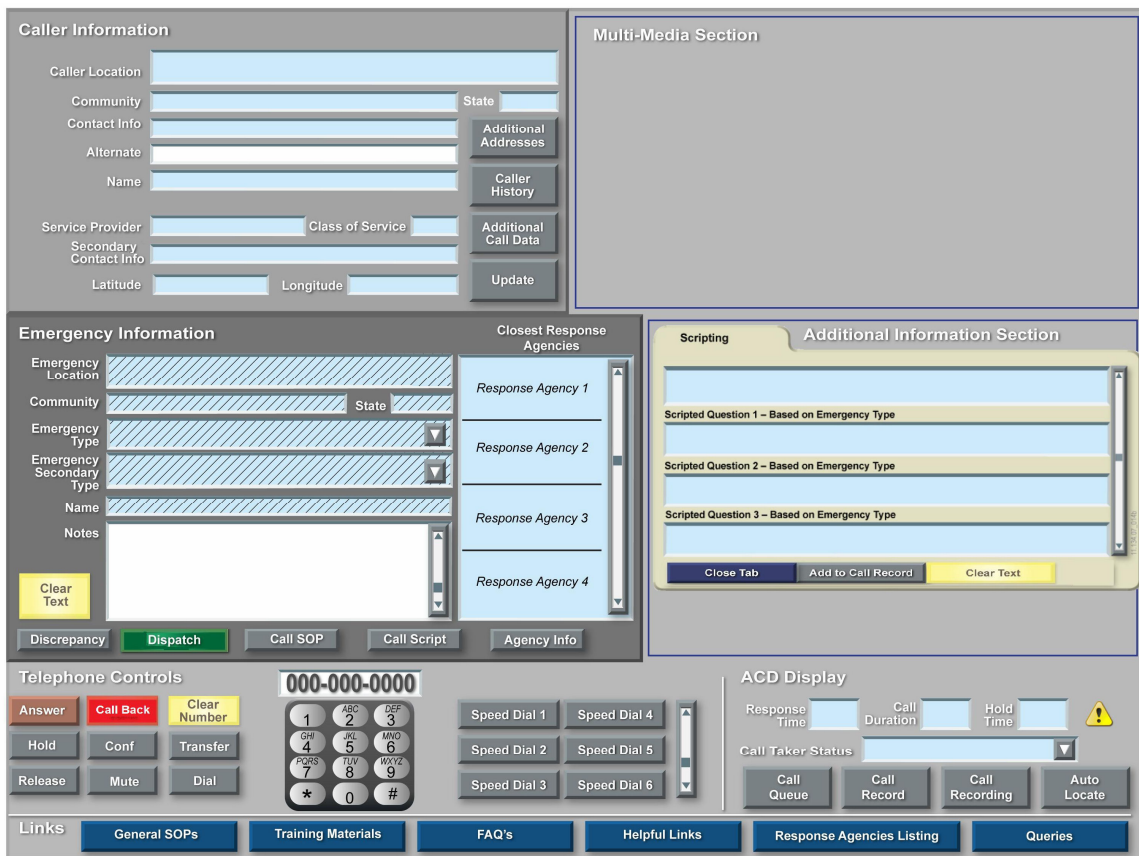**Figure 4.2—HMI Main Console (Pop-Up Sections Deactivated)**
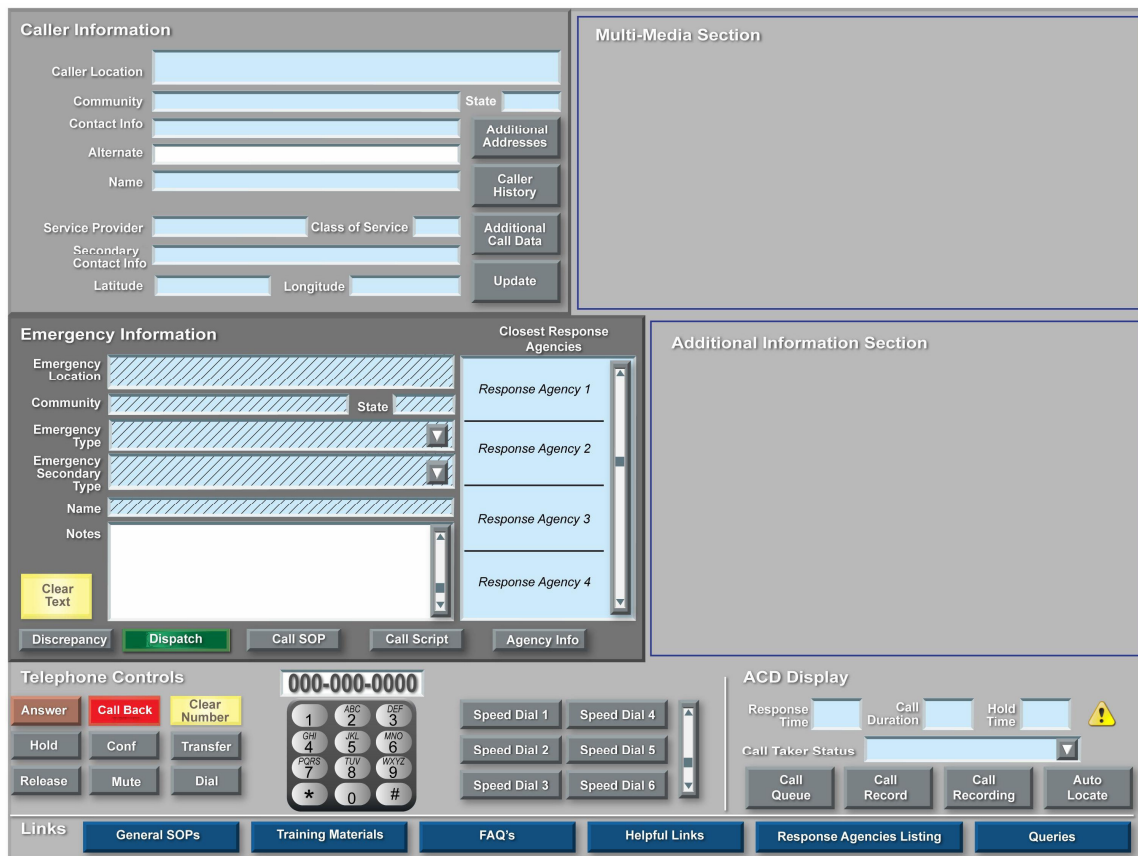
### 4.1.2    Standard Voice Call (with Additional Information Tab Activated)

By activating the Script button, a Pop-Up screen with specific information associated with the Emergency Type, is displayed to the user (see Section 4.3.3, Scripting ).  The call taker will be able to activate this script during the call to guide the interrogation of the caller, as well as to allow the call taker to provide the caller with specific instructions related to the emergency.  Furthermore, the call taker will be able to activate Agency Detail, Caller History, and Call Record tabs to use as reference during the call.  As shown in Figure 4.3, the selected Scripting Pop-Up tab is highlighted to indicate that it is currently in use, and the remaining tabs are grayed out.  The call taker will click on the tab, and it will be activated with the appropriate Pop-Up message.  If the call taker decides to open another Additional Information tab (e.g., Call Queue), that tab will be the main activated tab.  Each of the tabs will contain a Close Tab feature, to enable call takers to close the tab if it is no longer necessary.

**Figure 4.3—HMI Main Console with Additional Information (Pop-Up Section 2) Activated**



In Figure 4.3, the Multimedia section remains deactivated because the call does not contain any multimedia data.

### 4.1.3  Multimedia Call

The HMI Main Console contains functionality for call takers to receive multimedia calls (i.e., video/interactive video, static images, and text messages).  Call takers will be able to view and interact with this multimedia data by using the Multimedia section (Pop-Up Section 1).  If multiple types of media are received, the associated Pop-Ups will be activated.  For example, if a caller sends both a text message and an image, both the TTY/TDD/Txt Message and Image Pop-Up displays will be shown to the call taker.

The call taker will have access to all of multimedia data types simultaneously from the Multimedia section.  Call takers will be able to switch between the tabs as necessary to access needed data.  Furthermore, the call taker may need to view a call script and other information associated with the call.  The Additional Information Display (Pop-Up Section 2) will be activated with the necessary call data.  Each of the tabs (for both Pop-Up sections) will contain a Close Tab button to enable call takers to close the tab if it is no longer necessary.  Figure 4.4 shows the HMI Main Console when both Multimedia and Additional Information sections are activated.

**Figure 4.4—HMI Main Console for a Multimedia Call**
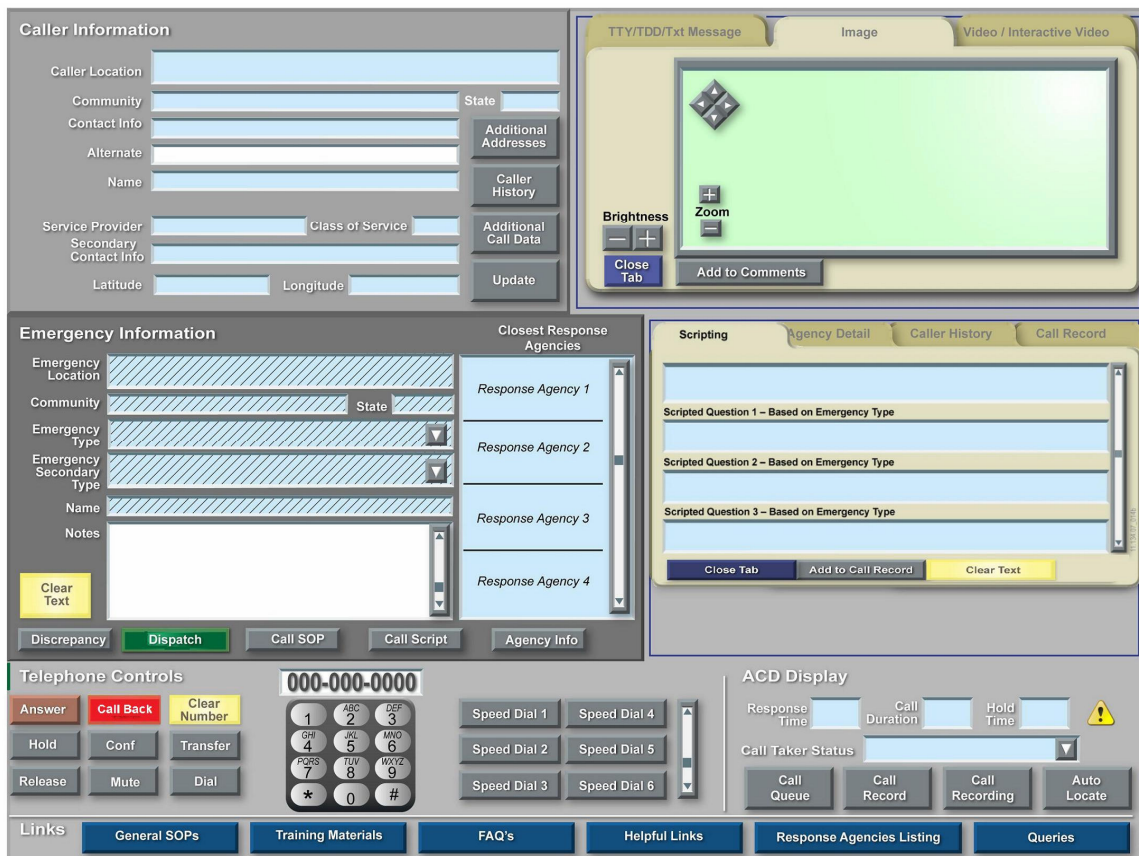
The caller will be able to initiate a video call with the call taker or request the assistance of a call interpreter. The Video/Interactive Video tab is available from the Multimedia Display (Pop-Up Section 1). The supporting image and text message is accessible to the call taker from his/her respective multimedia tabs, allowing the call taker to view them if necessary.

If a call interpreter is requested for the call, the Call Interpreter Pop-Up display activates in Pop-Up Section 2. To ensure that the call taker will always be in contact with the caller, as well as to maintain the standardized presentation information on the display, the Call Interpreter Pop-Up display is the only Multimedia display that is not activated in the Multimedia Display Pop-Up Section 1. The HMI will offer the possibility to view the Call Interpreter section for the purpose of storing the interpreter's actions as part of the call record as well as maintaining visual contact between the interpreter and the call taker.

Figure 4.5 shows the HMI Main Console display with activated Interactive Video Display and the Call Interpreter Pop-Up.

**Figure 4.5—HMI Main Console for Video Call with Activated Video Display and Call Interpreter Pop-Up**
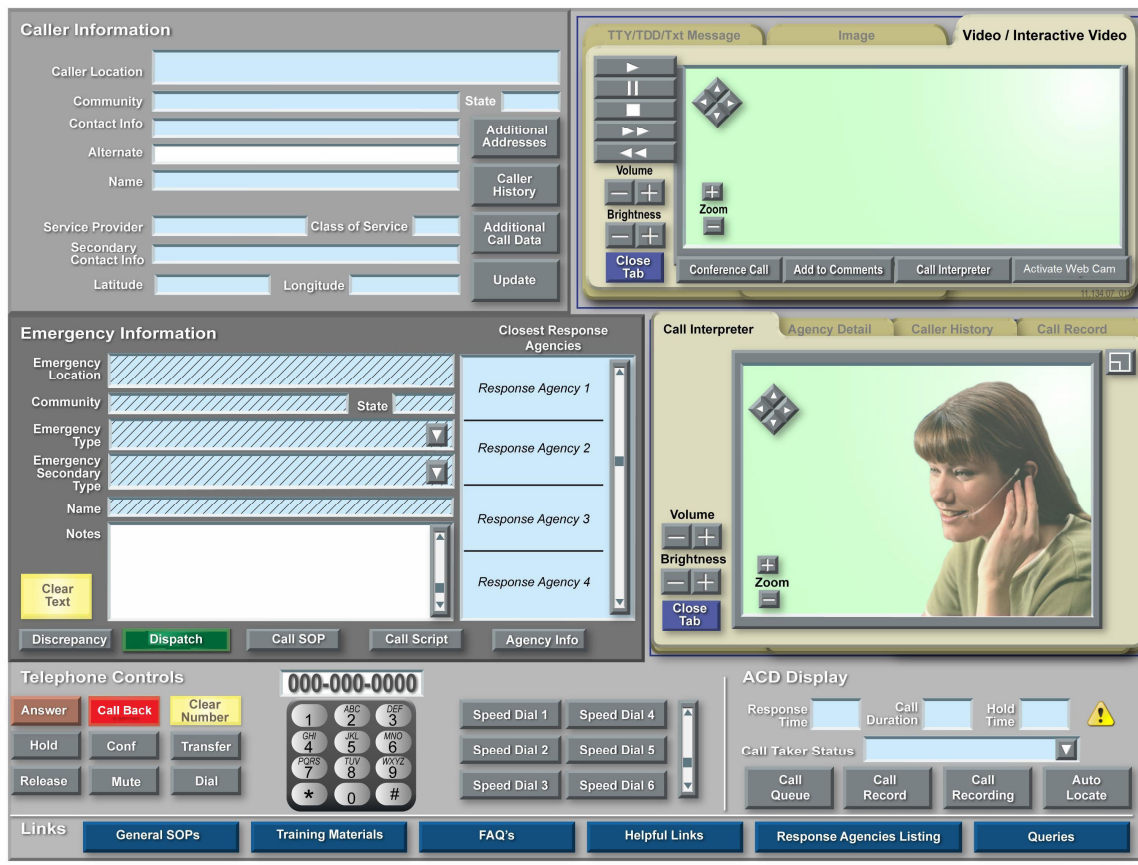
The call taker may need to use a script or view Additional Data for the call during the video call. To provide for this functionality, the Call Interpreter Pop-Up can be moved anywhere around the HMI Main Console display. It can also be resized to prevent the Pop-Up from blocking any necessary data. Figure 4.6 shows the HMI Main Console display with the Video/Interactive Video Multimedia section 2 tab activated, Additional Information Pop-Up Section 2 activated with a call script, and the Call Interpreter window resized and moved to the center of the display. As in the previous scenarios, the call taker will be able to view a number of Multimedia and Additional Information Pop-Ups during a single session by switching between tabs during the call. Activated tabs are highlighted, whereas deactivated tabs are grayed out.

**Figure 4.6—HMI Main Console for Video Call with Activated Video Display, Call Interpreter Pop-Up, and Additional Information Pop-Up Sections**
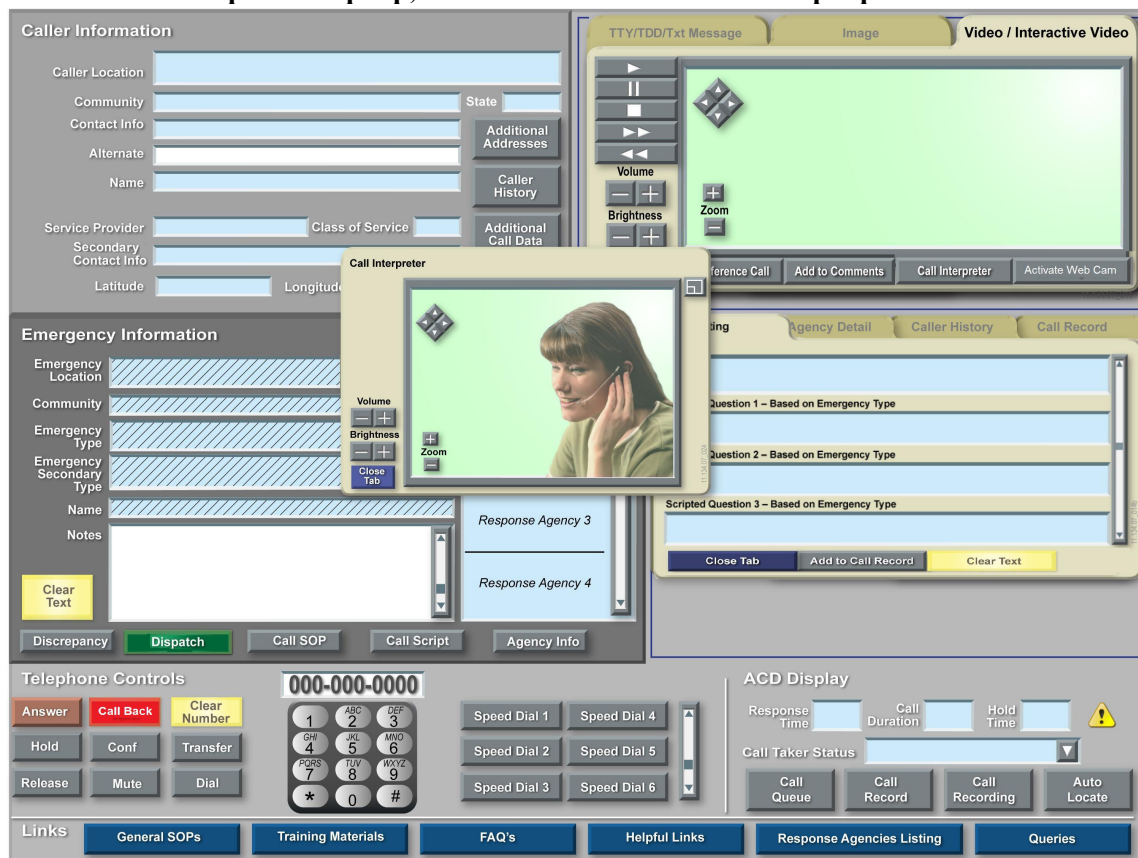


### 4.1.4 TTY/TDD Call

The HMI Main Console contains functionality to enable call takers to receive and maintain a teleconference with a person who is speech- or hearing-impaired using a TTY/TDD device or text-based system. In the NG9-1-1 environment, these callers will be able to use text messaging and video phones/devices in addition to TTY/TDD, the only direct 9-1-1 access method today.

For the purposes of this document, TTY/TDD calls are considered multimedia in that in addition to the text-based conversation, additional data is received by the call taker that will help make response-based decisions.

When a TTY/TDD call is received, the HMI Main Console will display the TTY/TDD/ Txt Message Pop-Up that contains the text-based conversation.

Figure 4.7 shows the HMI Main Console display with the TTY/TDD/Text Messaging Pop-Up screen activated.

**Figure 4.7—HMI Main Console for TTY/TDD Call with Activated**
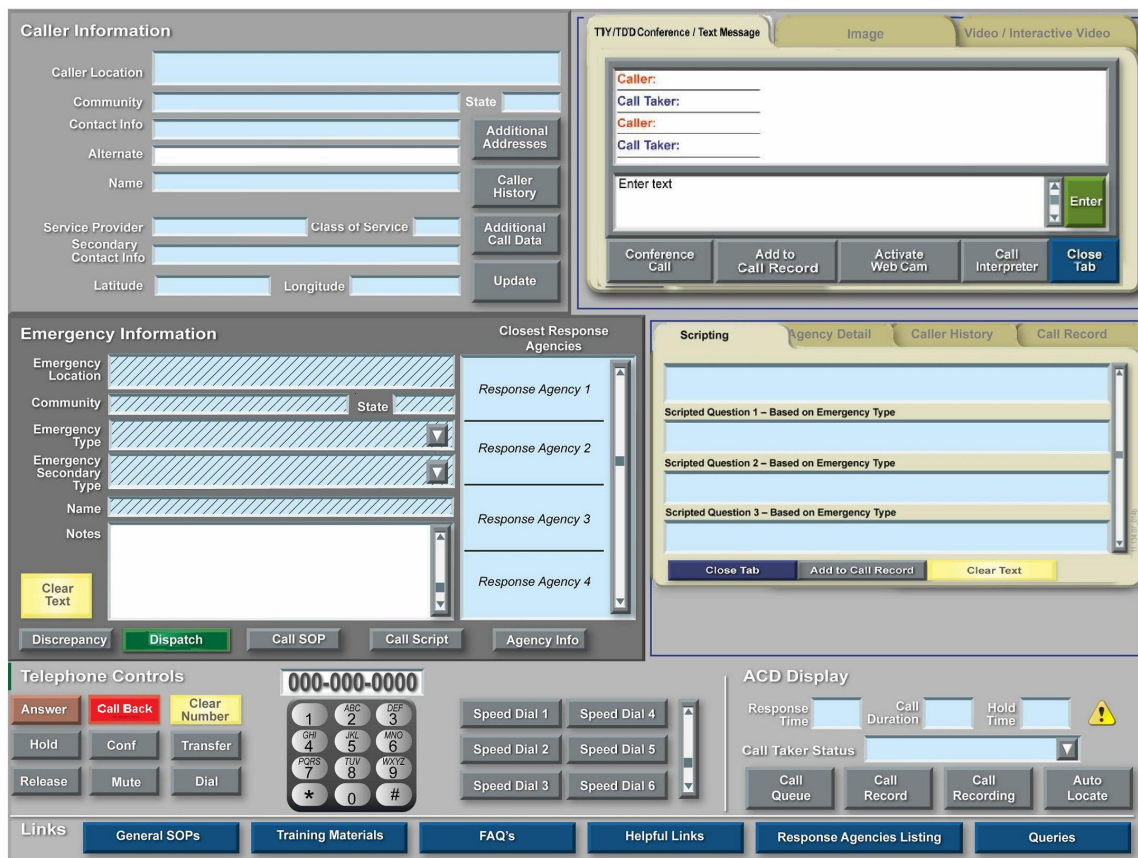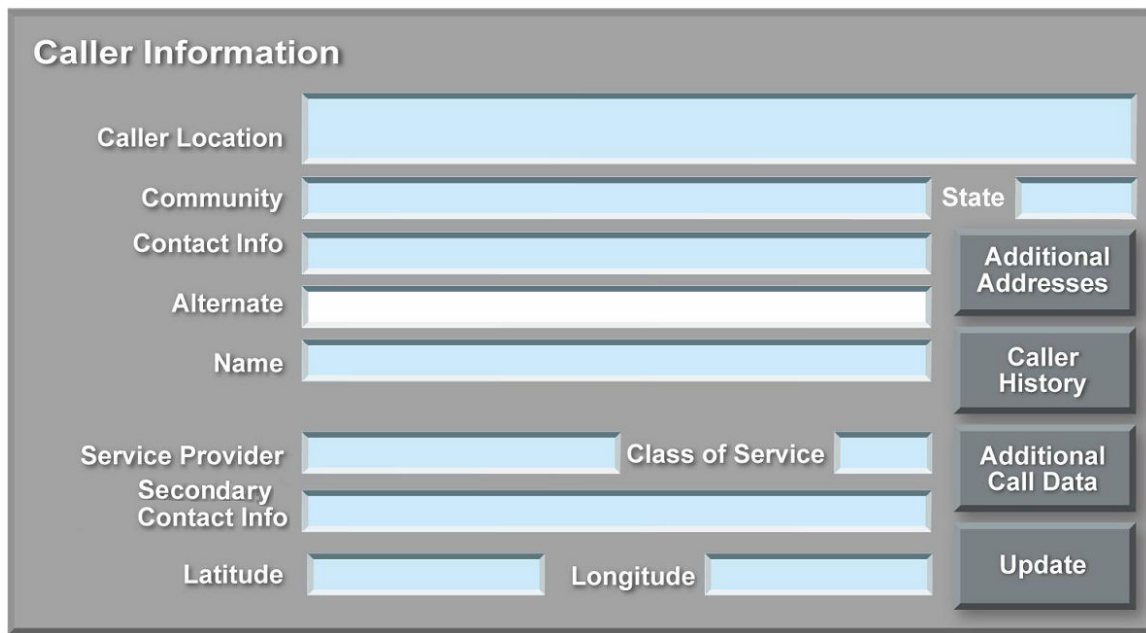


## 4.2 Caller Information Sub-Section

The first sub-section of the Main HMI Console is the Caller Information sub-section. It contains information about an incoming call based on information received about the caller device from the NG9-1-1 System. This sub-section is primarily a read-only area and contains information related to caller location, contact information, and latitude/ longitude data.

### 4.2.1 Caller Information Sub-Section Screen Layout

The Caller Information sub-section contains information about the caller, including contact and location information. This information will be populated by the NG9-1-1 System, which receives information about the call origination device from the various data and call services connected to the network. Call takers will read this information as needed to process the emergency. This information includes Caller Location, Community, State, Contact Information, Name associated with the call device, as well as Latitude and Longitude data. The sub-section also contains information about the Service Provider and the Class of Service for the device. The only area that the call taker will be able to edit is the Alternate field—which allows the call taker to add a new number that may be associated with the call. A number of Pop-Up screens, including Additional Addresses, Caller History, Additional Call Data, and Update fields are available to the call taker from this sub-section. Figure 4.8 shows the layout for the Caller Information sub-section.

| Call Taker Functional Activities Supported by the Caller Information Sub-Section |
| --- |
| **Call Answering** |
| Answer Call (CA-ANSCL) |
| **Call Processing** |
| Determine and Verify Location of the Emergency (CP-VFLOC) |
| Update Mobile Caller's Location Information (CP-UCLOC) |
| **Call Records Management** |
| Obtain Supportive or Supplemental Data Post Call Delivery (CR-OSSDT) |
| **Geospatial Visualization** |
| Display Geospatial Visualization (GV-DSGEO) |
| Manipulate Geospatial Data (GV-MPGEO) |
| **Data Management** |
| Submit Caller Information Error Report (DM-SCIER) |

**Figure 4.8—Caller Information Sub-Section Layout**



Three Pop-Up screens can be accessed from the Caller Information sub-section:

- Additional Addresses

- Caller History
- Additional Call Data.

If the system has information to populate one of the Pop-Up screens, the associated button will flash and change text font to give the call taker a visible indicator that more information is available. Call takers will be able to view the additional information by selecting the appropriate button, after which the information will populate the Additional Information Pop-Up Section 2. Sections 4.2.2–4.2.4 describe the Pop-Up screens of the Caller Information sub-section.

**Caller Information Sub-Section Features and Components**

Caller Information sub-section components and their detailed description and functionality are described in Table 4.2.

**Table 4.2—Caller Information Sub-Section Components**

| Field Name | Field Type | Field Description | Input | Output |
|---|---|---|---|---|
| Caller Location | Read-Only Text Field | Displays the physical location of caller determined from the address of the device or service from which he/she is calling. | • Data from Location Information Server (LIS)/ Mobile Positioning Center (MPC) <br> • GIS <br> • Address assigned to the device | • Provides location on the Map Display <br> • Automatically feeds Emergency Location |
| Community | Read-Only Text Field | Displays the municipality containing the caller's location. | • Data from LIS/MPC <br> • GIS <br> • Address assigned to the device | • Provides location on the Map Display <br> • Automatically feeds Emergency Location |
| State | Read-Only Text Field | Displays the state in which the community is located. | • Data from LIS/MPC <br> • GIS <br> • Address assigned to the device | • Provides location on the Map Display <br> • Automatically feeds Emergency Location |
| Contact Info | Read-Only Text Field | Displays contact information for the caller. This can be a call back telephone number but could also be an e-mail address, a universal resource locator (URL), an instant messaging (IM) Name, or other personal identifying contact information. | • Data from LIS/MPC <br> • Other database <br> • Device configuration | • Call Record database |

| Field Name | Field Type | Field Description | Input | Output |
|---|---|---|---|---|
| Alternate | Text Field | Displays alternate contact information. For example, this could be a cellular telephone number for a text message, or a call back number for an IM client. This can be sent with the call data or entered by the call taker. | • Data from LIS/MPC<br>• Other database<br>• Device configuration<br>• User entry | • Call Record database |
| Name | Read-Only Text Field | Displays the registered name of the device user. | • Data from LIS/MPC<br>• Other database<br>• Device configuration | • Call Record database |
| Service Provider | Read-Only Text Field | Displays the caller's service provider. This can be the service provider with which the user has a contract, or in the case of a roaming user, the service provider at the time of the call. | • Data from LIS/MPC<br>• Other database<br>• Device configuration | • Call Record database |
| Class of Service | Read-Only Text Field | Displays the type of service the caller is using. In traditional systems, this is called class of service, but will include many new classes in the future. This is sometimes referred to as a Call Type. | • Data from LIS/MPC<br>• Other database<br>• Device configuration | • Call Record database |
| Secondary Contact Info | Read-Only Text Field | Displays the main contact information for the caller. In the case of a private branch exchange (PBX), this may be the main switchboard number, or in a text message, it could be a URL for the service provider or hosting service. | • Data from LIS/MPC<br>• Other database<br>• Device configuration | • Call Record database |
| Latitude | Read-Only Text Field | Displays the latitude of the caller in a decimal format, for example, 040.1234. | • Data from LIS/MPC<br>• GIS<br>• Address assigned to the device | • Provides location on the Map Display<br>• Automatically feeds Emergency Location |
| Longitude | Read-Only Text Field | Displays longitude of the caller in a decimal format, for example, -091.1234 | • Data from LIS/MPC<br>• GIS<br>• Address assigned to the device | • Provides location on the Map Display<br>• Automatically feeds Emergency Location |
| Additional Addresses | Selection Button | Opens a Pop-Up screen. If there are additional addresses associated with the caller, such as a network address or tower location, these will populate the Additional Addresses screen, and the button will change to a brighter color to give a visual indicator to the call taker. | • Data from LIS/MPC<br>• Other database<br>• Device configuration | • User Display<br>• Call Record database |

| Field Name | Field Type | Field Description | Input | Output |
|---|---|---|---|---|
| Caller History | Selection Button | Opens a Pop-Up screen. If there is any call history associated with the caller, it will populate the Caller History screen, and the button will change to a brighter color to give a visual indicator to the call taker. | • Call Record database | • User Display<br>• Call Record database |
| Additional Call Data | Selection Button | Opens a Pop-Up screen. If there is any additional information associated with the caller, such as telematics information or medical history, it will populate the Additional Call Data screen, and the button will change to a brighter color to give a visual indicator to the call taker. This information should be the information with clear text labels or links to other data sources. | • Data from LIS/MPC<br>• Other database<br>• Device configuration | • User Display<br>• Call Record database |
| Update | Action Button | Queries the LIS and other databases to receive an update or to resend the data associated with the caller. | • Data from LIS/MPC<br>• Other database<br>• Device configuration | • User Display<br>• Call Record database |

**Requirements**

Key NG9-1-1 Tier 1 requirements addressed by the Caller Information sub-section deal with the capability of the screen to present location information about the caller extracted from the call originating device, as well as latitude and longitude information. The call taker will also be able to access the caller history, view call data, and access other supplemental and supporting data from this sub-section of the HMI Console. A complete list of requirements addressed by the Caller Information sub-section and its Pop-Up screens is provided in Appendix D of this document—Requirements Traceability Matrix.
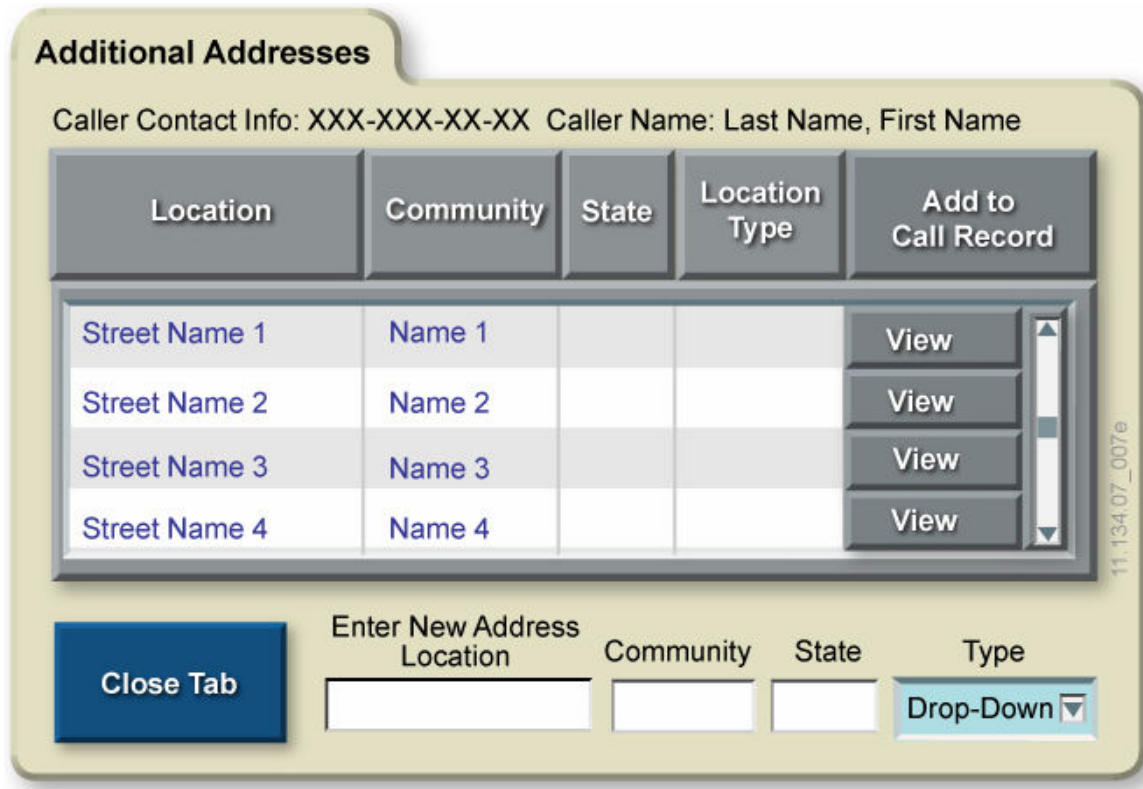
### 4.2.2 Additional Addresses Pop-Up

The Additional Addresses Pop-Up displays other addresses for the call device, if they are available. If the system or the service provider uses several locations, the addresses are captured by the Additional Addresses Pop-Up. These can also be additional addresses that a service provider collects from a registered user such as the home or work address.

The Additional Addresses Pop-Up screen contains a button to enable the call taker to add the address data to the comments of the incident record along with a time stamp. This feature may not be needed often because the data will also be contained in the call record database.

The key location information is displayed on the screen. If there is additional information associated with this location, the call taker will be able click on the line to a link to this information. This will allow the call taker to drill down to the level of data that he/she needs without cluttering up the screen with unnecessary information.

The call taker will also be able to add an additional address to this field if there is a new address that has not been captured by this screen. This may be a secondary address for the caller, such as a work address that has not been updated in the service provider records. Call takers will be able to add new address information using this section of the screen. Figure 4.9 shows the layout for the Additional Addresses Pop-Up screen.

**Figure 4.9—Additional Addresses Pop-Up Screen Layout**



### 4.2.3  Caller History Pop-Up

The Caller History Pop-Up screen is populated by the PSAP call record database. Information on all previous calls or contacts is listed in order, with the most recent first. This function is established by the PSAP business rules. These rules also determine what is displayed. The call taker will be able to pull up detailed information (if it is available) by clicking on an incident, or by selecting the View Call Record button. This triggers the Call Record Pop-Up (see Section 4.4.4) to open, which contains detailed historic information about the call, allowing the call taker to drill down to the level of detail needed for a particular call.

A call taker will use this screen to determine the history of the caller, and often it will allow him/her to assist in the processing of requests for service in the event of recurring incidents. Figure 4.10 shows the layout for the Caller History Pop-Up screen.

**Figure 4.10—Caller History Pop-Up Screen Layout**
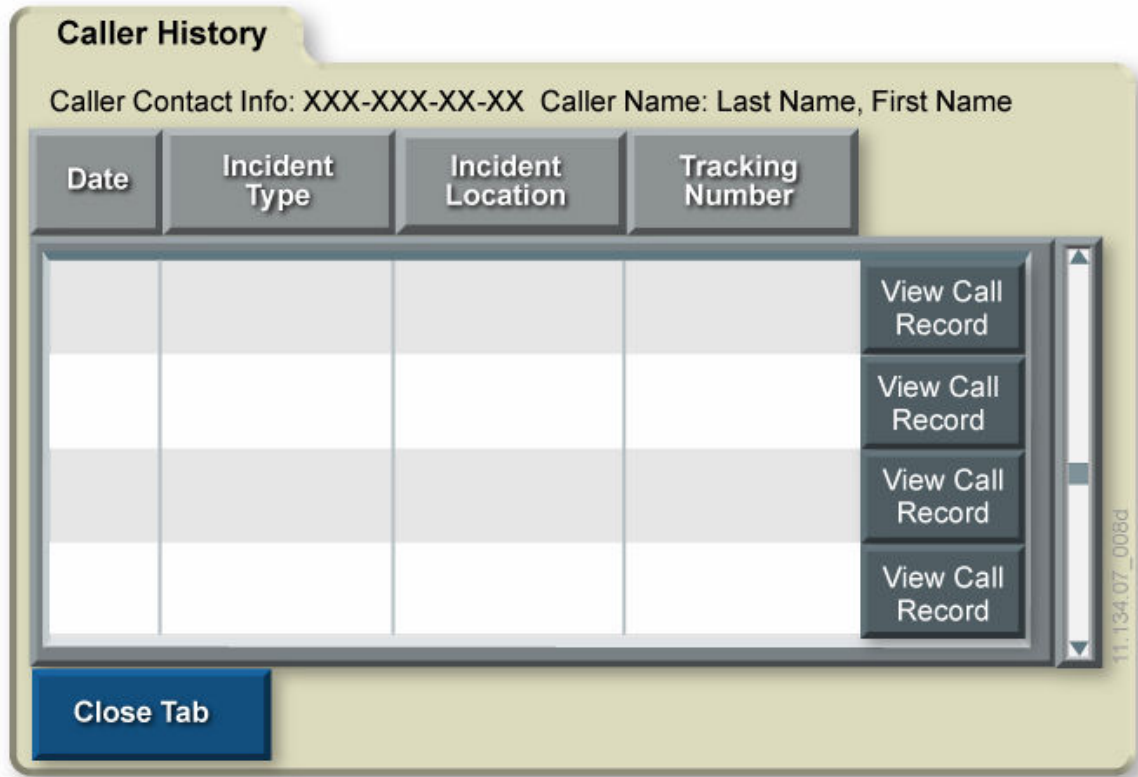


## 4.2.4  Additional Call Data Pop-Up
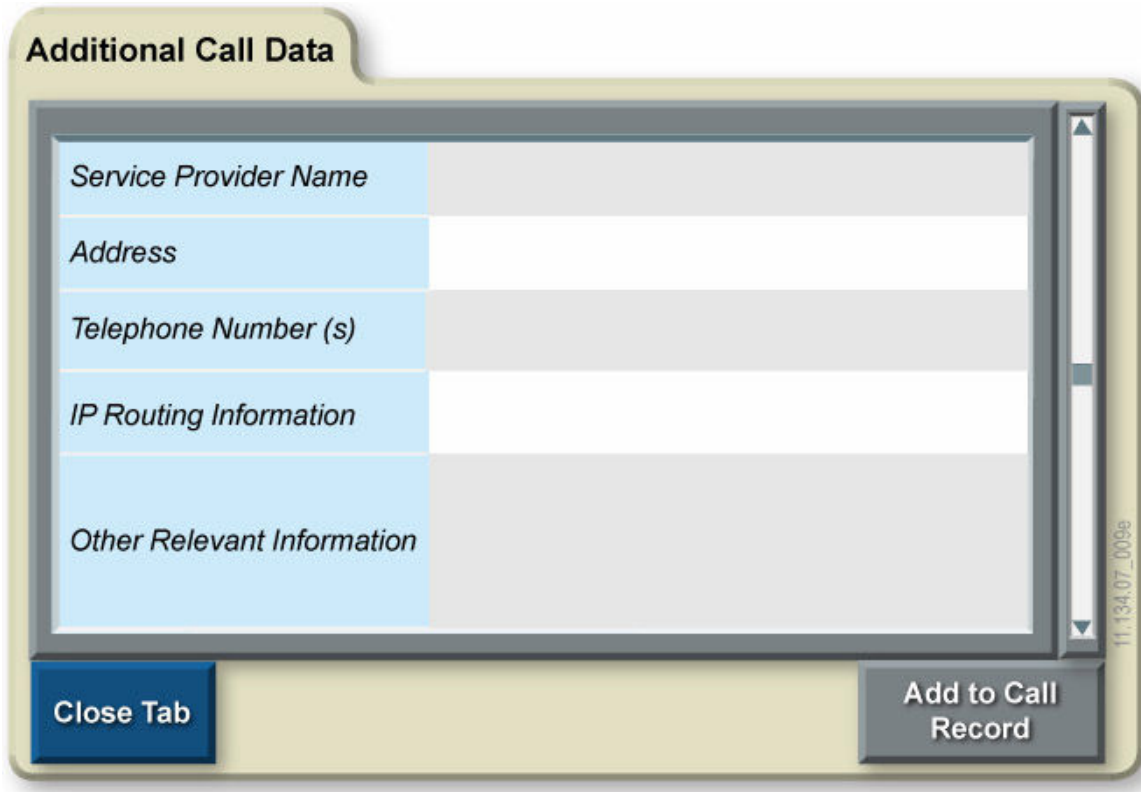
Additional information shared during the call is displayed in the Additional Call Data (Pop-Up Section 2).  This information can be a URL link to medical records, telematics, or locally stored database information.  This will be different for each PSAP based on the services that the PSAP uses or has access to, and the business rules of the PSAP that determine the level of detail displayed to the call taker.

Information that is displayed directly should be labeled with clear text labels.  For example if eXtensible Markup Language (XML) tags are used, the clear text of the tag should be used to label the data, not just the tag.  These clear text labels are important to ensure clear understanding of the information by the call taker.

This screen also has a button to add the information to the incident comments.  The contents of this screen is established by the PSAP business rules.

A call taker will use this screen to obtain additional information such as the severity of an impact in a vehicle crash to determine the level of response that is needed for an emergency.  Figure 4.11 shows the layout for the Additional Call Data Pop-Up screen.

**Figure 4.11—Additional Call Data Pop-Up Screen Layout**
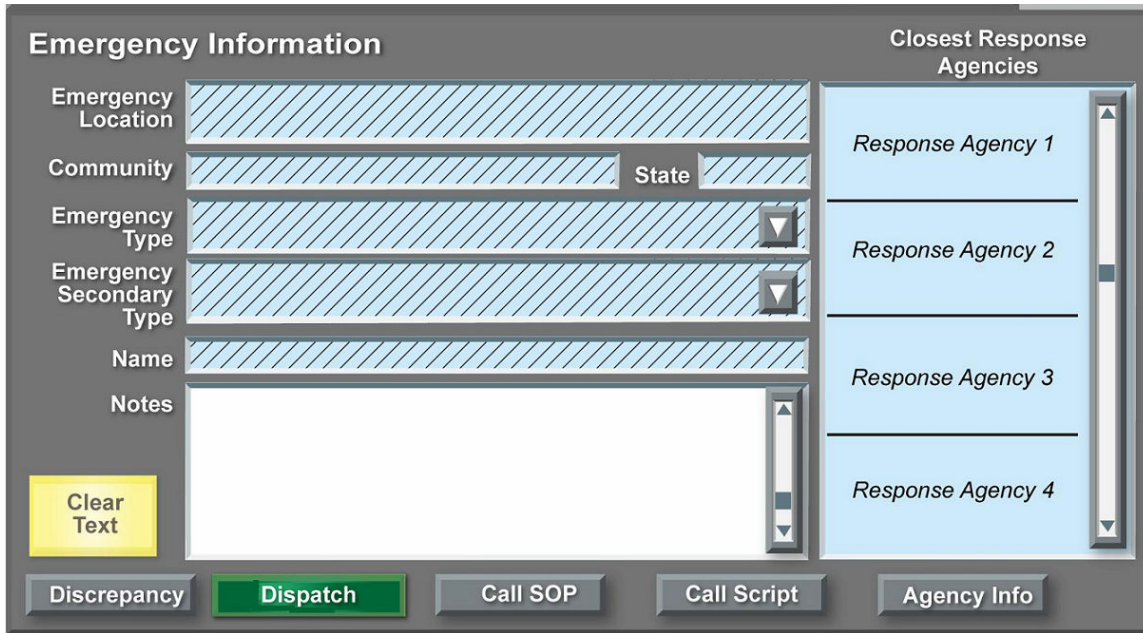


## 4.3 Emergency Information Sub-Section

The Emergency Information sub-section provides information about the emergency, including emergency location and emergency type.  The location of the emergency is pre-populated with information extracted from the Caller Information sub-section; however, the call taker will be able to change this data if the emergency location is different than the caller's location.

### 4.3.1  Emergency Information Sub-Section Screen Layout

The call taker will use the Emergency Information sub-section to enter data about the emergency and to update information sent to the PSAP about the caller.  The screen also allows the call taker to view response agencies that are identified based on emergency type and location.  Several Pop-Up screens are accessible from the Emergency Information sub-section, including Call SOP, Call Scripts, Agency Directory, Agency Detail, and Caller Information Discrepancy.  Figure 4.12 shows the layout for the Emergency Information sub-section.

**Figure 4.12—Emergency Information Sub-Section Layout**



At the time of the call, the emergency information is populated based on the caller's location information (Section 4.2.1). The call taker will be able to change the location information if the emergency location is different from the one provided by the caller. This is useful in the event that a person calls to report an incident that he/she is witnessing at another location such as a fire across the street.

The caller will be able to enter the type of emergency during queue waiting period. The Emergency Type field will populate with this information, if it is provided. However, the call taker will be able to enter and/or change the Emergency Type (Fire, Police, EMS) from the Emergency Type drop-down menu. The Emergency Secondary Type is a sub-menu of the Emergency Type. Based on the emergency type selected and the PSAP business rules, the menu changes and can also be used as a free text field. As an example, the caller may have an EMS emergency.

| Call Taker Functional Activities Supported by the Emergency Information Sub-Section |
|---|
| **Call Processing** |
| Determine Nature of the Emergency (CP-DTNAT) |
| Determine and Verify Location of the Emergency (CP-VFLOC) |
| Identify Appropriate Responding Agency or Service (CP-IDRES) |
| Provide Pre-Arrival Instructions to Caller (CP-PRINS) |
| **Call Records Management** |
| Obtain Supportive or Supplemental Data Post Call Delivery (CR-OSSDT) |
| Transfer Call (CR-TRCIN) |
| **Geospatial Visualization** |
| Display Geospatial Visualization (GV-DSGEO) |
| Manipulate Geospatial Data (GV-MPGEO) |
| **Data Management** |
| Submit Caller Information Error Report (DM-SCIER) |

The call taker selects the EMS entry from the Emergency Type drop-down menu. The Emergency Secondary Type drop-down menu populates with all common medical emergencies. The call taker selects the Emergency Secondary Type (i.e., Heart Attack) or enters text if the emergency is not available in the list (i.e., Dental Problem). If the emergency is both a medical and a police emergency, the call taker will be able to enter EMS into the Emergency Type field, and Police into the Emergency Secondary Type.

As new information is entered into the Emergency Location field, the other fields on the Emergency Section update. The Responding Agencies Listing automatically updates based on the Emergency Type and Location entry. Based on the update to an Emergency Type entry, the Responding Agency listing may change again or a support agency may be added to the list. These changes would all be based on the business rules of the PSAP.

The call taker will be able to enter notes about the emergency using the free-text Notes section. The notes can contain any information call takers believe is relevant to the emergency. The call taker will also be able to choose to send information to the dispatch agency by selecting the Dispatch button. This triggers sharing with the dispatcher of the call record (Section 4.4.4), which includes Emergency Type and Location, multimedia data, notes, and other call-related data.

Call takers will be able to access a variety of tools and components from the Emergency Information sub-section that will enable them to manage and handle the call. Call Scripts and Call SOP Pop-Ups become available based on the entered Emergency Type. The call taker will be able to view Agency Directory and Agency Detail if additional information about the responder is needed. The selected Pop-Up populates in Additional Information Display (Pop-Up Section 2). Sections 4.3.2—4.3.5 describe the Pop-Up screens of the Emergency Information sub-section.

**Emergency Information Sub-Section Features and Components**

Table 4.3 details the function of the fields and buttons on the Emergency information screen.

**Table 4.3—Emergency Information Sub-Section Components**

| Field Name | Field Type | Field Description | Input | Output |
|---|---|---|---|---|
| Emergency Location | Text Field | Displays the actual location of the reported emergency. Populated by the NG9-1-1 System with the caller's location, but the call taker can manually update it if needed. | • Data from LIS/MPC <br> • GIS <br> • Address assigned to the device <br> • Manual entry | • Map Display <br> • Call Record database |
| Community | Text Field | Displays the actual community where the emergency is being reported. Populated by the NG9-1-1 System with the caller's information, but the call taker can manually update with information if needed. | • Data from LIS/MPC <br> • GIS <br> • Address assigned to the device <br> • Manual entry | • Map Display <br> • Call Record database |

| Field Name | Field Type | Field Description | Input | Output |
|---|---|---|---|---|
| State | Text Field | Displays the actual state where the emergency is being reported. Populated by the NG9-1-1 System with the caller's information, but the call taker can manually update with information if needed. | • Data from LIS/MPC<br>• GIS<br>• Address assigned to the device<br>• Manual entry | • Map Display<br>• Call Record database |
| Emergency Type | Drop-Down Menu or Text Field | Displays a list of Emergency Types based on PSAP business rules unless the device or network is capable of sending this information to the PSAP. | • Assigned to the device<br>• Manual entry | • Map Display<br>• Emergency Secondary Type<br>• Response Agencies<br>• Call Record database |
| Emergency Secondary Type | Drop-Down Menu or Text Field | Displays a list of the Emergency Types. Based on the Emergency Type selected and the PSAP business rules, the menu will change and can also be used as a free text field. | • Manual entry | • Response Agencies<br>• Call Record database |
| Name | Text Field | Displays the actual name of the caller. Populated by the NG9-1-1 System with the caller's information, but the call taker can manually update it with information if needed. | • Data from LIS/MPC<br>• GIS<br>• Address assigned to the device<br>• Manual entry | • Call Record database |
| Notes | Text Field | Displays a free text field to enter data on the reported emergency. Has a time stamp feature to track when notes are entered. | • Manual entry | • Call Record database |
| Response Agencies | Linked Text Display | Displays a list of response agencies based on the Emergency Location, Emergency Type, and PSAP business rules. Has links to additional information. For example, the call taker can click on an agency, and the Agency Detail sub-screen for that agency pops up. | • System assigned<br>• User entry | • Call Record database |
| Clear Text | Button | Clears the text from the screen. | • User action | • None |
| Discrepancies | Button | Brings up the Caller Information Discrepancy sub-screen. | • User action<br>• Caller information | • Call Record database<br>• Report to service provider |
| Dispatch | Button | Sends the incident to the dispatch function. Based on PSAP business rules, this will most likely activate an application programming interface (API) to the PSAP's CAD system. | • User action | • Call Record database |

| Field Name | Field Type | Field Description | Input | Output |
|---|---|---|---|---|
| Call SOP | Button | Opens the SOP sub-screen.  The SOP will be based on the PSAP business rules and the Emergency Type. | • User action<br>• Emergency Type<br>• PSAP business rules | • Call Record database |
| Script | Button | Brings up the Scripting sub-screen based on the PSAP business rules and Emergency Type.  This may also activate an API to a third-party dispatch protocol. | • User action<br>• Emergency Type<br>• PSAP business rules | • Call Record database |
| Agency Info | Button | Brings up the Response agency directory.  The call taker can select an agency to add to an incident, or reference the information. | • Emergency Location<br>• Emergency Type<br>• PSAP business rules<br>• Manual entry | • Response Agency display<br>• Call Record database |
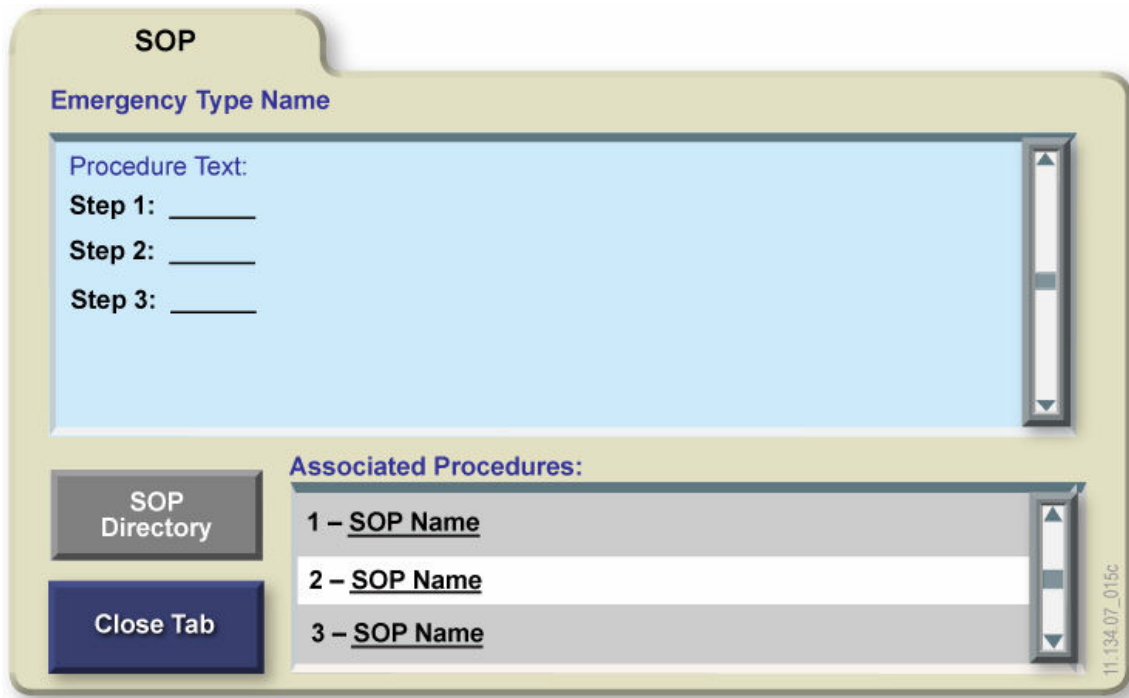
**Requirements**

Key NG9-1-1 requirements addressed by the Emergency Information sub-section deal with determining the location and type of the emergency and selecting appropriate responder agencies based on the location and type of the emergency, as well as enabling call takers to log the displayed responder agencies for each call.  Call takers will also be able to access business rules and call handling procedures from this section.  A complete list of requirements addressed by the Emergency Information sub-section and its Pop-Up screens is provided in Appendix D—Requirements Traceability Matrix.

## 4.3.2  Call SOP Pop-Up

The Call SOP button opens the Call SOP Pop-Up screen.  The system populates this screen based on the Emergency Type and the PSAP business rules.  If the selected SOP is not correct, the call taker will be able to access the directory of all SOPs and select the appropriate SOP.  The Associated Procedures area will populate with a listing of SOPs identified for the emergency type and/or multimedia type.  If there is no Emergency Type selected, the button can select a general SOP or the Directory of all SOPs based on PSAP business rules.  Figure 4.13 shows the layout of the Call SOP Pop-Up screen.

**Figure 4.13—Call SOP Pop-Up Screen Layout**



Call SOPs can be based on the class of service, the emergency type, responder agency, or other category the PSAP chooses. The call taker will use these to process the request for service in the proper manner.

As an example, the call taker can use the SOPs as a reference during a video call, if he/she does not get this type of call frequently. In many PSAPs today, SOPs are often available only in hardcopy or as manual query. Implementing the Call SOP Pop-Up provides immediate electronic access to the specific reference information needed for the call. This feature is particularly beneficial for less experienced call takers or those currently in training, and reinforces agency policy and procedure for call handling.

### 4.3.3 Scripting Pop-Up

The Script button opens the Scripting Pop-Up screen. The script is selected and displayed based on the Emergency Type. The script may be PSAP-generated questions or an API to a third-party dispatch protocol. Figure 4.14 shows the layout of the Scripting Pop-Up screen.

**Figure 4.14—Scripting Pop-Up Screen Layout**
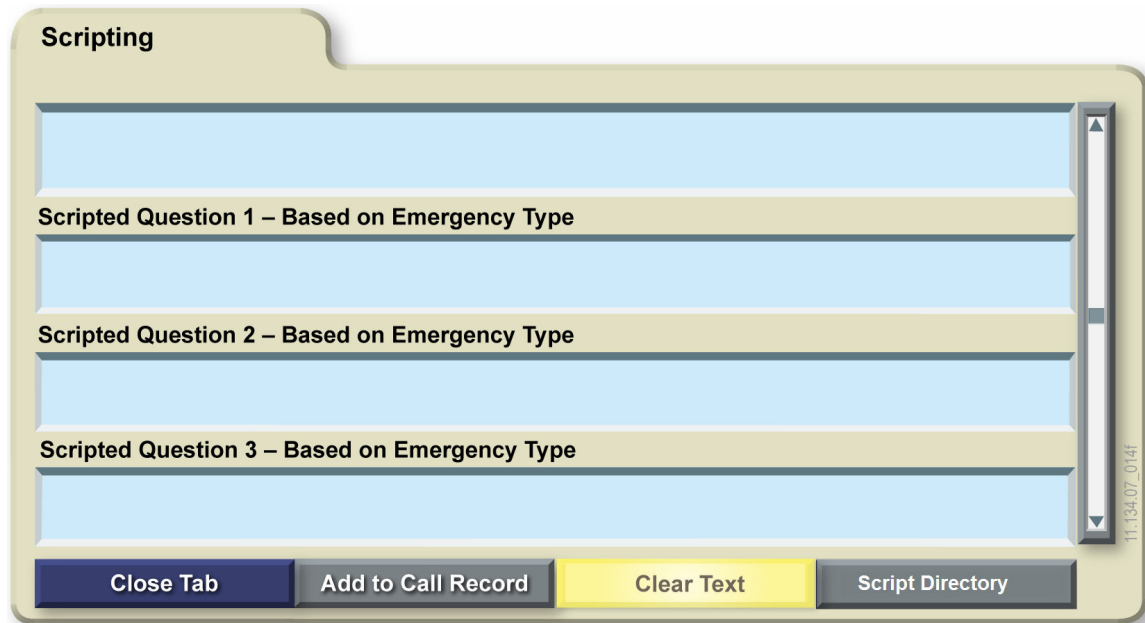


The call taker will have a script directory button to access all scripts if they need to change scripts.  If no Emergency Type is selected, the PSAP business rules will allow a general script or the script directory to be displayed.

Each question is displayed with a text field or drop-down box to enter the data, which will allow the call taker to enter notes and responses to the script.  Pre-arrival information is listed at the top of the page (if it is available). This Pop-Up screen will have four control buttons:

- Close Tab—Closes the scripting tab.
- Add to Call Record—Adds entered information to the Call Record.
- Clear Text—Clears the entered text from the screen.
- Directory—Provides access to scripting directory, which will open as another Pop-Up message.
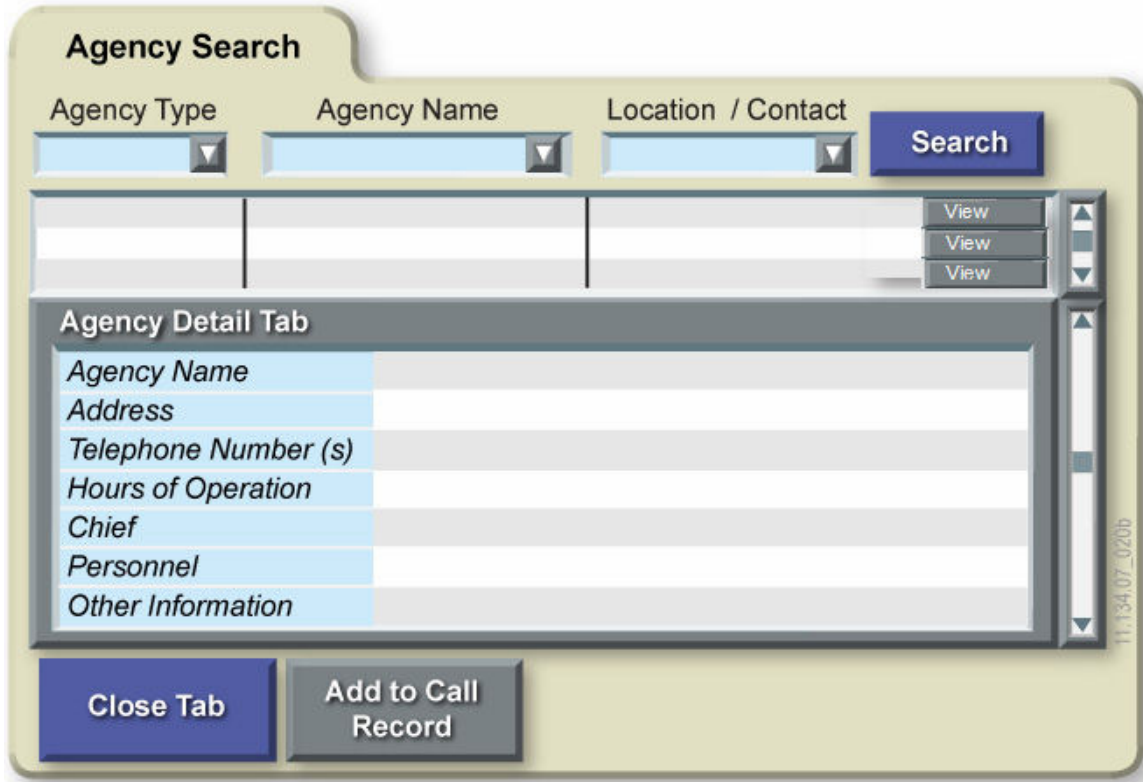
Call scripting is an important feature for many PSAPs.  These scripts help to ensure requests for service are processed in a uniform manner and that the call taker asks for all key information.

### 4.3.4  Agency Search/Agency Detail Pop-Up

The Agency Information button brings up the Agency Search/Agency Detail Pop-Up screen.  This screen allows a call taker to search for an agency via query keys (Agency Type, Agency Name, and Location).  The call taker will be able to either use drop-down menus or enter text into the query fields.  The search generates a list of Response Agencies that match the search criteria.  The Agency Detail section provides specific

information about the selected agency. Figure 4.15 shows the layout of the Agency Search/Agency Detail Pop-Up screen.

**Figure 4.15—Agency Search/Agency Detail Pop-Up Screen Layout**



The call taker will be able to use this window to look up an agency for a caller or to contact the agency for administrative purposes. The Directory can be searched by the call taker if a caller does not have complete information. This can be useful when the call taker receives information such as "an officer Jones took my report, but I don't remember which department." If this information is available to the call taker based on the PSAP business rules, it can be searched.

Selecting an agency from the directory populates the Agency Detail section. This section can also be accessed by selecting an agency from the list of agencies displayed on the Emergency Information sub-section screen.

The information for each agency should include all details required by the call taker. These can include—

- Agency Name
- Address
- Contact methods (telephone, fax, IM, e-mail, etc.)
- Preferred methods of communication

- Personnel
- Hours of operation
- Services provided or not provided.

Typically, the source of this data would be the Emergency Provider Access Directory (EPAD[11]) database and will assist call takers in locating contact information for agencies within and outside their normal service jurisdictions.  This feature will be especially helpful for agencies handling incoming calls from a distinctly different geographic location (e.g., when a PSAP is taking overflow calls for another PSAP).
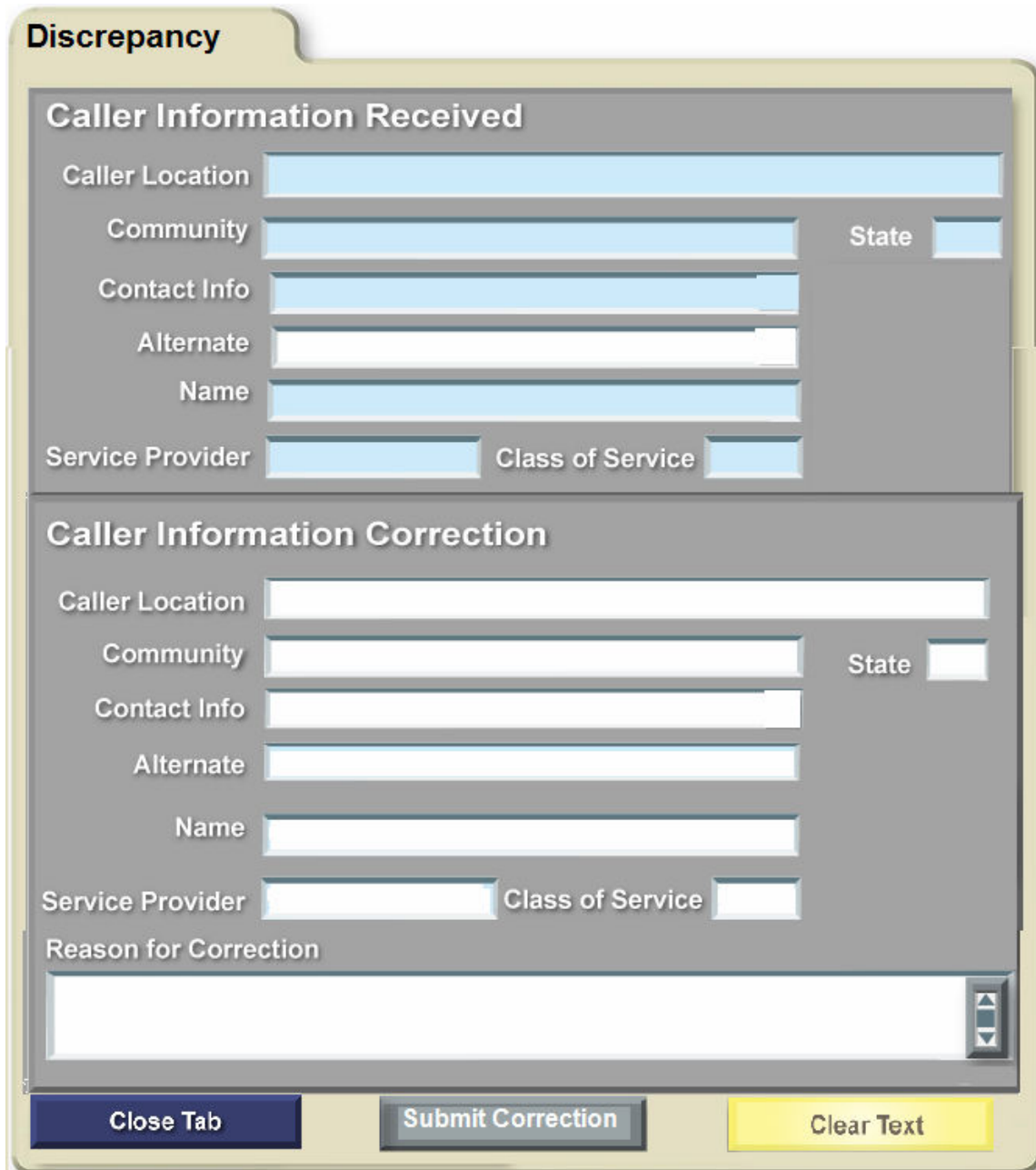
### 4.3.5  Call Information Discrepancy Pop-Up

The Discrepancy button will open the Call Information Discrepancy Pop-Up screen.  This is used to report discrepancies in information received from the service providers.  Various items of information may be outdated such as name, address, call back numbers, etc.

The Pop-Up screen populates with information from the Caller Information sub-section screen and contains fields to enter corrected information.  For example, the call taker can use this Pop-Up screen to report the change of address of a contact for a person who did not change his/her registered location with his/her service provider.  Figure 4.16 shows the layout of the Caller Information Discrepancy Pop-Up screen.

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[11] EPAD is a GIS-enabled database registry of local, state, and federal emergency authorities and public service providers.  More information may be found at: http://epad.us.

**Figure 4.16—Caller Information Discrepancy Pop-Up Screen Layout**



## 4.4 Telephone Controls and ACD Display Sub-Section

The Telephone Controls and ACD Display sub-section will allow call takers to answer, release, and transfer calls, as well view information regarding a call, including call time, duration, and time on hold. The screen will also allow call takers to manage call back and call recording procedures, and will give the caller the ability to view call queue and call record details.

### 4.4.1 Telephone Controls and ACD Display Sub-Section Screen Layout

The Telephone Controls section supports all call taker activities related to controlling the call request. These include answering, releasing, and muting the call; putting the caller on hold and taking the caller off hold using the hold button; and conferencing in or transferring the caller to a third party. A number of Speed Dial keys are provided directly on the display to minimize the time spent in dialing the full number. However, a standard telephone touch pad is available to the call taker to dial a number, if necessary, and a call back button will allow the call taker to call the caller back in the case the call is disconnected.

| Call Taker Functional Activities Supported by the Telephone Controls & ACD Sub - Section |
| --- |
| **Call Answering** |
| Manage Call Queue (CA -MNQUE) |
| Answer Call (CA -ANSCL) |
| Initiate Call Back (CA -INTCB) |
| **Call Processing** |
| Update Mobile Caller 's Location Information (CP-UCLOC) |
| Establish Conference Call (CP -ECONF) |
| **Call Records Management** |
| Record Call (CR -RCCAL) |
| Obtain Supportive or Supplemental Data Post Call Delivery (CR -OSSDT) |
| End Call (CR -ENDCL) |
| Transfer Call (CR -TRCIN) |

The ACD section allows call takers to view information regarding the call, including call time, duration, and time on hold. An alert indicator warns the call takers of a new incoming call or indicates that the caller has been on hold for a time that is longer than acceptable. Call takers will be able to change their availability status in ACD using a drop-down menu, as well as access the call queue, call record, and call recording Pop-Up displays. Figure 4.17 shows the layout of the Telephone Controls/ACD Display sub-section.

**Figure 4.17—Telephone Controls/ACD Display Sub-Section Layout**



Five Pop-Up screens can be accesses from the Telephone Controls/ACD sub-section:

- Call Back
- Call Queue
- Call Record
- Call Recording
- Auto Locate.

If the NG9-1-1 System has information that is contained in one of the Pop-Up screens, the button will change color to give the call taker a visible indicator that more information is available. Sections 4.4.2–4.4.5 describe the Pop-Up screens of the Telephone Controls/ ACD sub-section.

**Telephone Controls and ACD Display Sub-Section Features and Components**

Table 4.4 details the function of the fields and buttons on the Telephone Controls and ACD screen.

**Table 4.4—Telephone Controls and ACD Display Sub-Section Components**

| Field Name | Field Type | Field Description | Input | Output |
|---|---|---|---|---|
| Answer | Selection Button | Allows the call taker to pick up a call. An audible and visual alert will occur when a new call arrives. | • Call queue<br>• Call data | • Call Record database<br>• Call queue |
| Release | Selection Button | Allows the call taker to end a call. | • Call queue<br>• Call data | • Call Record database<br>• Call queue |
| Hold | Selection Button | Allows the call taker to place a call on hold and pick the call up from hold. | • Call queue<br>• Call data | • Call Record database<br>• Call queue |
| Call Back | Selection Button | Allows the call taker to call back the caller if the call was disconnected. This triggers a Call Back Pop-Up, which allows the call taker to select the communication type and the call back number. The call back button is highlighted in red to make it more noticeable to the call taker. | • Call queue<br>• Call data | • Call Record database<br>• Call queue |
| Conference | Selection Button | Allows the call taker to conference in another party during the call. The call taker will then either enter a number or select a number from Speed Dial keys to initiate the call. | • Call queue<br>• Call data | • Call Record database<br>• Call queue |
| Mute | Selection Button | Allows the call taker to place the caller on mute and pick the call back up from mute. | • Call queue<br>• Call data | • Call Record database<br>• Call queue |
| Clear Number | Selection Button | Allows the call taker to clear the entered number from the dial pad if an error was made entering the number. | • Call data | • None |
| Transfer | Selection Button | Allows the call taker to transfer the call to a third party. The call taker either will use the dial pad or select a number from one of the Speed Dial keys to transfer the call to the third party. | • Call queue<br>• Call data | • Call Record database<br>• Call queue |
| Telephone Dial Pad | Selection Buttons | Allows the call taker to manually enter a telephone number. The number will display at the Number Display screen above the dial pad. | • Call queue<br>• Call data | • Call Record database<br>• Call queue |
| Dial | Selection Button | Allows the call taker to submit a request to dial after the desired telephone number has been entered. | • Call queue<br>• Call data | • Call Record database<br>• Call queue |
| Number Display | Text Display | Displays the telephone number that the call taker is dialing. | | |

| Field Name | Field Type | Field Description | Input | Output |
|---|---|---|---|---|
| Speed Dial Key | Selection Button | Enables the call taker to select and dial a stored number. | • Call queue<br>• Call data | • Call Record Database<br>• Call Queue |
| Response Time | Text Display | Displays information about when the call was picked up by the call taker. | • Call queue<br>• Call data | • Call Record database<br>• Call queue |
| Call Duration | Text Display | Displays information regarding the duration of the call. | • Call queue<br>• Call data | • Call Record database<br>• Call queue |
| Hold Time | Text Display | Displays information regarding the time a caller has spent on hold. | • Call queue<br>• Call data | • Call Record database<br>• Call queue |
| Alert | Display | Flashes if a caller has spent an extended (longer than set up by the system) period on hold. | • Call queue<br>• Call data | • Call Record database<br>• Call queue |
| Call Taker Status | Drop–Down Menu | Allows the call taker to set up his/her Availability Status (i.e. Available, Busy, After Call Activity, etc.). | • Call queue<br>• Call data | • Call Record database<br>• Call queue |
| Call Queue | Selection Button | Allows the call taker to view the Call Queue via a Pop-Up screen. | • Call queue<br>• Call record | • Call queue<br>• Call Record database |
| Call Record | Selection Button | Allows the call taker to access the Call Record and Call Record Query Pop-Up. | • Call record | • Call record<br>• Call record query |
| Call Recording | Selection Button | Enables the call taker to access the Call Recording Pop-Up and Call Recording query. | • Call recording | • Call recording<br>• Call Recording database |
| Auto Locate | Selection Button | Allows the call taker to set up time constraints to automatically update the caller's location. | • Location information<br>• GIS | • Location Information<br>• GIS |

**Requirements**
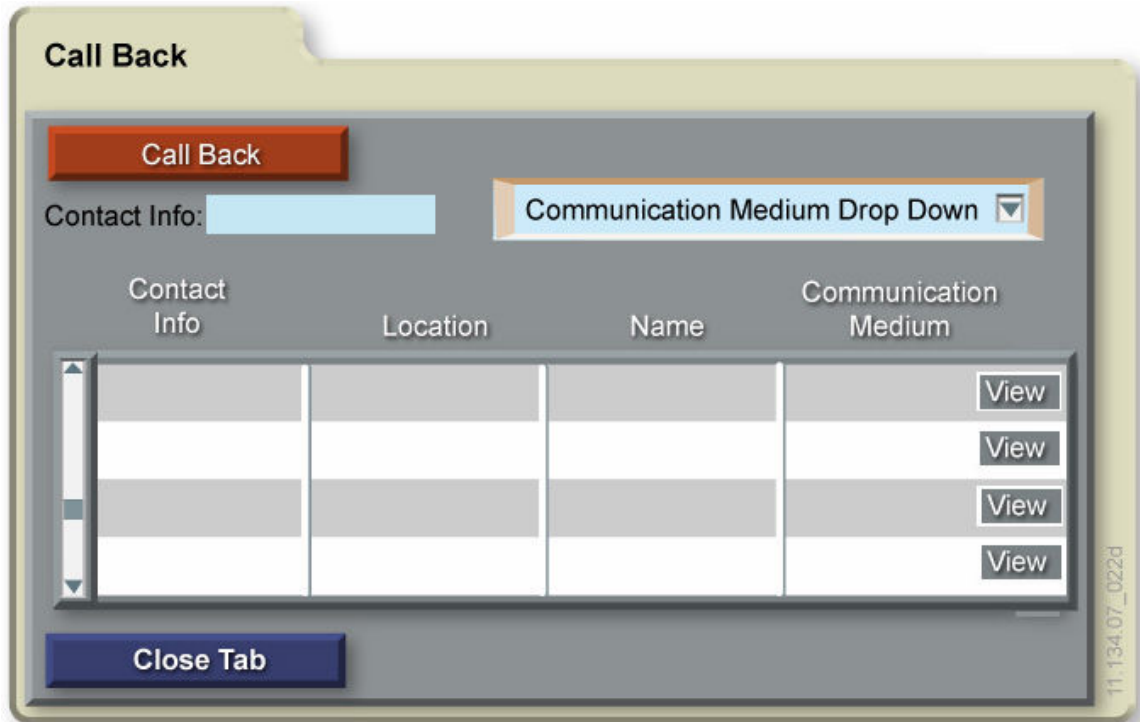
Key NG9-1-1 requirements addressed by the Telephone Controls and ACD sub-section ensure that the call taker will be able to answer a call, initialize a call back, access and query for call records and call recordings, monitor call queues, set hold times, receive alerts about the caller on hold, and set up an auto-locate feature. Call takers will also be able to select a call from a queue, transfer the call to a third party, and hold a conference with a third party. A complete list of requirements addressed by the Telephone Controls and ACD sub-section and its Pop-Up screens is provided in Appendix D—Requirements Traceability Matrix.

### 4.4.2  Call Back Pop-Up

The Call Back Pop-Up screen becomes available when the caller suddenly disconnects from the line. The call taker will be able to initiate a call back using the Call Back button. Because the NG9-1-1 System will be able to identify what device and

communication medium was used to initiate the call, it will suggest a similar communication method for the call back. However, the call back Pop-Up feature will allow the call taker to either immediately call back the caller using the last stored number and communication medium used, or change the communication medium and the number (i.e., calling the service provider of the wireless device that originated the text message). Figure 4.18 shows the layout of the Call Back Pop-Up screen.

**Figure 4.18—Call Back Pop-Up Screen Layout**



As shown in the figure above, contact number and suggested communication medium will default to the original number and communication method used. The call taker will be able to enter the call back button to initiate the call. If call taker wants to used a different communication medium (i.e., from Text Message to Voice Call), he/she will be able to change it using the communication medium drop-down menu. Furthermore, the call taker will be able to select a different contact number, which will be used to place the call by looking through a list of the contact numbers associated with the originating number and selecting the View button.

### 4.4.3  Call Queue Pop-Up

The Call Queue Pop-Up screen enables the call taker to view all calls that are in the queue. It is accessible from the ACD section of the Telephone Controls and ACD sub-section and will be displayed in the Additional Information Pop-Up Section 2. Figure 4.19 shows the layout of the Call Queue Pop-Up screen.

**Figure 4.19—Call Queue Pop-Up Screen Layout**



From the Call Queue Pop-Up, call takers will be able to view the Contact Information for the call.  If the caller provided details about the emergency, the Emergency Type field will be populated with the data.  Call queue will also display information about the time a call was placed into the queue, duration of the call in queue, and call pick-up time.  If the caller is placed on hold, the time a call was placed on hold will be highlighted, and total hold time will be displayed.  Call takers will be able to pick up the call (initial answer or from hold) at any time by either clicking on the call line or by clicking the Pick-Up button.  If the call remains unanswered or on hold for a period of time that is longer than suggested by the NG9-1-1 System, the call ID line and the call pickup button will flash.  The Call Queue button on the Main HMI Console (of the ACD Display section) will also flash and provide an audible signal to the call taker, to alert him/her of the extended call time in queue.

### 4.4.4  Call Record and Call Record Query Pop-Up

The Call Record and Call Record Query Pop-Up screen contains all information about the call.  The call taker will be able to access it at any time during the call from the ACD control panel.  The Call Record Pop-Up will populate the Additional Information Pop-Up Section 2.  Call takers will also be able to search for a call using the Call Record Search Query section at the top of the field.  Once the necessary call is found, the call taker will be able to view call details by clicking on the line that contains the call summary.

The Call Record section contains information gathered about the call during its duration.  The Call Record Pop-Up is composed of four unique subsections that together provide the call taker with a holistic view of the call and its outcome.  This record can be accessed either for an ongoing call, or from the Caller History Pop-Up screen for any

previous calls received from the caller. Figure 4.20 the layout of the Call Record Pop-Up screen.

**Figure 4.20—Call Record and Call Record Query Pop-Up Screen Layout**
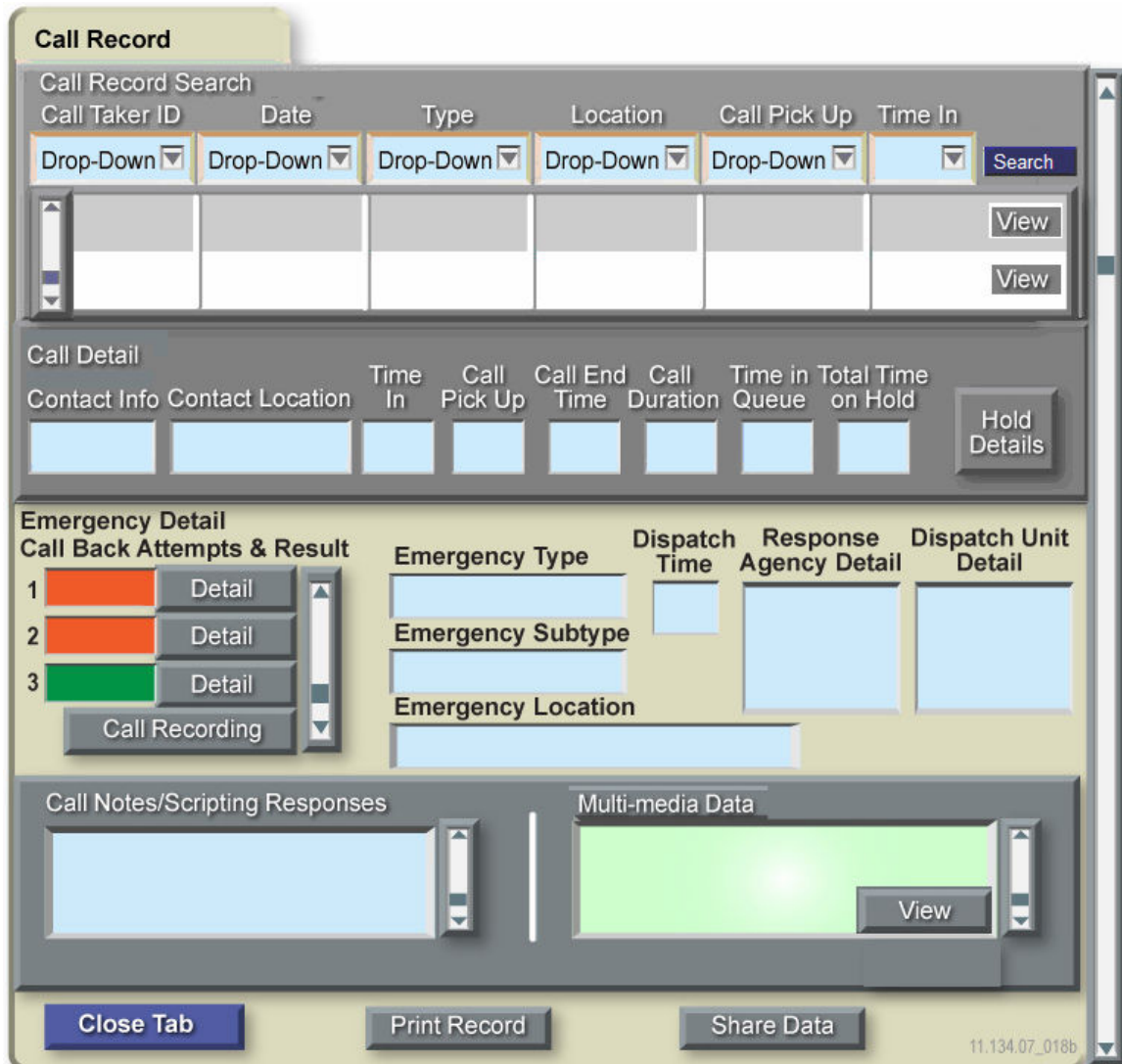


The Call Record section of the Call Record and Call Record Query Pop-Up is composed of the following sub-sections:

- The Call Detail section contains information related to the caller, including the contact information (i.e., telephone number), contact location, the time call was placed, the time at which the call was answered, and call end time, which is recorded after the caller hangs up the call. Call duration and total time in queue information is also available. In addition, the section captures the total duration of hold time that the caller experienced. The Hold Details button opens a new small screen that captures details about each time the caller was placed on hold.

- The Emergency Details section contains information about the emergency itself. If the call was disconnected, this section of the document will provide an indication of Call Back attempts, which are color coded to show whether the call back was completed. (Orange indicates unsuccessful attempt, Green indicates that the attempt was successful). The call taker will be able to access detail about each call back attempt by either clicking on the call line or selecting the Detail button, which will load a Call Back Pop-Up screen (described in the previous section). The call taker can scroll through all of the call back attempts. This section also contains all emergency information (type/subtype), location of the emergency, and details about the Response Agency and Dispatch unit sent to the location. The call taker will be able to access the Call Recording Pop-Up (described in the following section) by clicking the Call Recording button to listen to the recording of the call. The Call Recording Pop-Up will open as a new tab in the Additional Information Pop-Up Section 2. The Location Details button opens a screen that contains the list of locations tracked for the emergency. Because there may be more than a single location of the emergency (i.e., getaway car chase), the screen captures location updates.

- The Call Notes/Scripting Responses section contains all notes and responses to scripted questions, entered by the call taker during the call. Notes will be displayed in chronological order. The call taker will be able to scroll through the notes section using scroll bar keys.

- The Multimedia data section contains all multimedia communication associated with the call. Call takers will be able to scroll through the multimedia data using the scroll bar keys on the right. Call takers will also be able to select to view the multimedia data by clicking on the View button. The selected multimedia data will populate the Multimedia Display Pop-Up Section 1.

Call takers will also be able to print the record, share data with a third party, or close the call record window using the appropriate controls at the bottom of the screen. If a call data record is to be shared with a third party, a new Pop-Up window will display allowing the call taker to select the Call Record recipient.
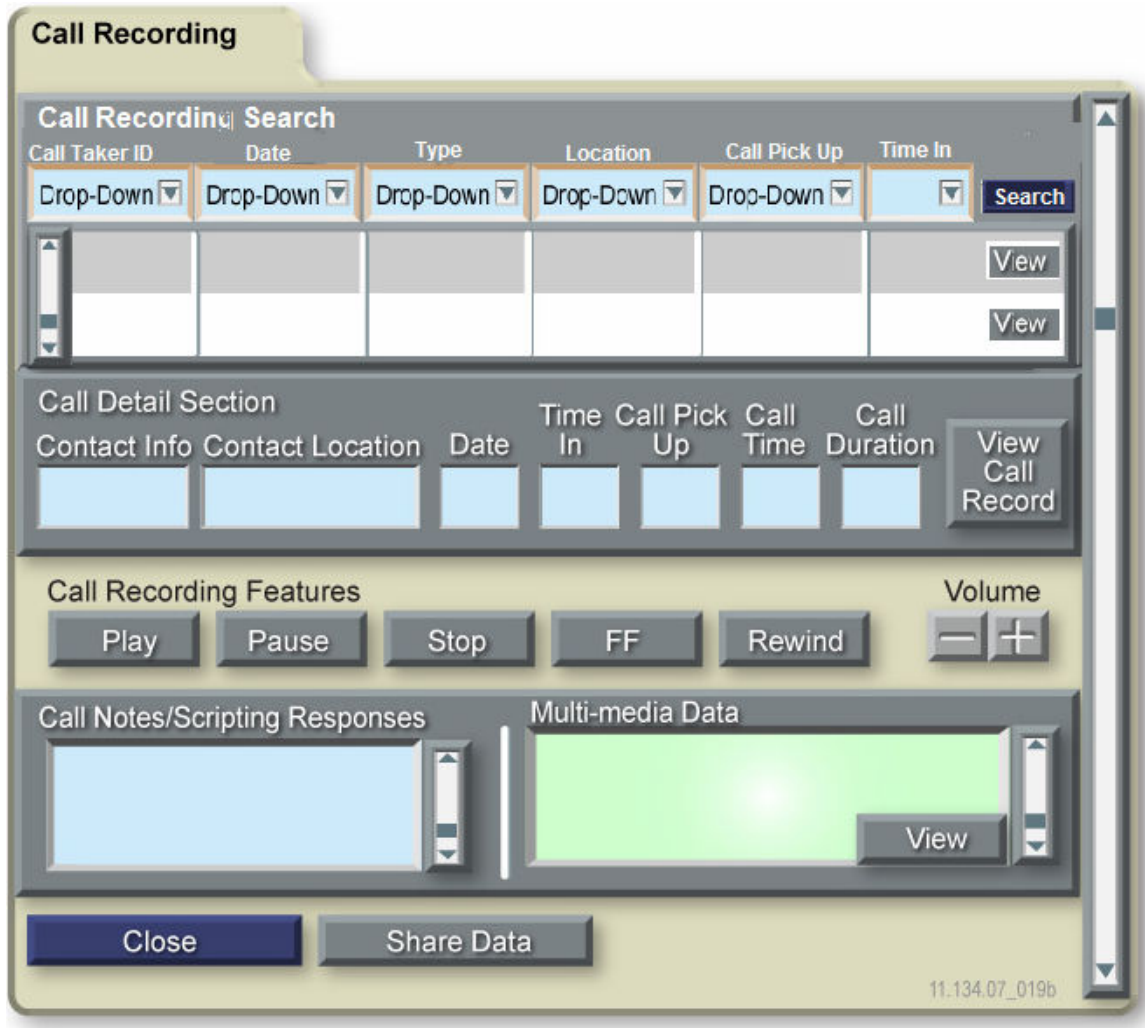
### 4.4.5  Call Recording and Call Recording Query Pop-Up

The Call Recording and Call Recording Query Pop-Up screen can be accessed from the ACD section of the document as well as from the Call Record Pop-Up display. The call taker will also be able to search for a call recording from the top Call Recording Query section by specifying the call search parameters.

Call recording will allow the call taker to manage the call recording controls, including play, fast forward, rewind, pause, and stop functions. The Call Recording Pop-Up will also allow the call taker to view notes and multimedia data associated with the call, if they are needed for reference. The call taker will be able to scroll through the notes and multimedia data using scroll bar keys. To view the multimedia data, the call taker will select the View button. The selected multimedia data will populate the Multimedia

Display Pop-Up Section 1.  Figure 4.21 shows the layout of the Call Recording Pop-Up screen.

**Figure 4.21—Call Recording Pop-Up Screen Layout**



### 4.4.6  Auto Locate Pop-Up

The Auto Locate Pop-Up screen will allow the call taker to set update parameters to retrieve the caller's new location.  Call takers can enter the Auto Locate button to update the caller's location.  Call takers will also be able to set their own update frequency by using the Auto Locate button.  Data retrieved from this field will populate the Caller Information sub-section of the Main HMI Console.  Figure 4.22 shows the layout of the Auto Locate Pop-Up screen.

**Figure 4.22—Auto Locate Pop-Up Screen Layout**



## 4.5 Call-Taker Helpful Links Sub-Section

The Call-Taker Helpful Links sub-section is designated to display any additional information needed by the call taker to obtain additional data.  Links to this necessary information are provided at the bottom of the Main HMI Console display.

Links for General SOPs, Training Materials, FAQs, Helpful Links, Response Agencies Listing, as well as other links that will be identified by each PSAP, will generally be used after the call has ended because they are supporting links and are not required during the time of the call.  These links will display over the HMI display (after the call), or in a separate display during a call.

| Call Taker Functional Activities Supported by the Caller Taker Helpful Links Sub-Section |
| --- |
| **Call Processing** |
| Identify Appropriate Responding Agency or Service (CP-IDRES) |
| **Call Records Management** |
| Obtain Supportive or Supplemental Data Post Call Delivery (CR-OSSDT) |
| **Data Management** |
| Submit Caller Information Error Report (DM-SCIER) |

The Queries link is the only link in the bottom section that may be required to be accessed at the time of the call.  This links will populate as a Pop-Up in Additional Information Pop-Up Section 2.  The query field provides (but is not limited to) the capability to conduct searches for Supplementary and Supporting data, Caller History, Call Record, Additional Addresses, Additional Call Data, Telematics Information,

Response Agencies details, and other data that may be identified by PSAPs.  Figure 4.23 shows the layout of the Call Taker Helpful Links sub-section.

**Figure 4.23—Call Taker Helpful Links Sub-Section Layout**



## Screen Features and Components

Table 4.5 details the function of the fields and buttons on the Call Taker Helpful Links sub-section.

**Table 4.5—Call Taker Helpful Links Sub-Section Components**

| Field Name | Field Type | Field Description | Input | Output |
|---|---|---|---|---|
| General SOPs | Selection Button | Allows the call taker to access the General SOPs list (online).  It is suggested that the SOPs screen should populate a separate display so it will not interfere with the view of the emergency call data. | • Access to PSAP/ External Databases | • SOP Directory |
| Training Materials | Selection Button | Allows the call taker to access Training Materials (online).  It is suggested that the Training Materials screen should populate a separate display so it will not interfere with the view of the emergency call data. | • Access to PSAP/ External Databases | • Training Materials Directory |
| FAQs | Selection Button | Allows the call taker to access FAQs (online).  It is suggested that the FAQs screen should populate a separate display so it will not interfere with the view of the emergency call data. | • Access to PSAP/ External Databases | • FAQ's Listing |
| Helpful Links | Selection Button | Allows the call taker to access Helpful Links (online).  It is suggested that the Helpful Links screen should populate a separate display so it will not interfere with the view of the emergency call data. | • Access to PSAPs data | • Links to external websites |
| Responding Agency Listing | Selection Button | Allows the call taker to access a complete listing of Responding Agencies.  It is suggested that the listing should populate a separate display so it will not interfere with the view of the emergency call data. | • Access to PSAP/ External Databases | • Consolidated listing of Response Agencies |
| Queries | Selection Button | Allows the call taker to access a complete listing of Queries set up locally by the PSAP.  It is suggested that the listing should populate a separate display so it will not interfere with the view of the emergency call data. | • Access to PSAP/ External Databases | • Listing of a variety of queries that pull information from a variety of sources |

## Requirements Addressed by the Screen

Key NG9-1-1 requirements addressed by the Call Taker Helpful Links sub-section ensure that the call taker will be able to conduct a number of query searches, including searching for Call Records, Call Recordings, Supporting and Supplementary data, and have the ability to look through EPAD database.  A complete list of requirements addressed by the

Call Taker Helpful Links sub-section and its Pop-Up screens is provided in Appendix D—Requirements Traceability Matrix.

## 4.6 Multimedia Displays

The Multimedia displays are activated when a multimedia call or multimedia data supporting a call is received. The multimedia displays are populated in the Multimedia display Pop-Up Section 1 (see Section 4.1 for reference). It is recommended that a second full screen should be used to view the Multimedia data (See Section 4.5), particularly for interactive video calls, which may require both a caller sub-screen and a sign interpreter sub-screen because these two sub-screens on the main screen have limited viewing space. The following Multimedia displays have been identified:

- TTY/TDD/Text Messaging
- Image
- Video/Interactive Video
- Call Interpreter.

Multimedia data, including TTY/TDD and text message, image, video/interactive video data, are displayed via Pop-Ups in the Multimedia Display Pop-Up Section 1. Because a variety of data may be received with a call, the data will populate the Multimedia Display using tabs. This will allow the call taker to switch between multimedia types during a single call. If a TTY/TDD call is received, and the call taker requires a call interpreter, the Call Interpreter multimedia display will populate the Additional Information Pop-Up Section 2. This will ensure that the call taker will be able to maintain the interactive video call with the caller, while using the Call Interpreter as well.

| Call Taker Functional Activities Supported by the Multi-media Displays |
|---|
| **Call Answering** |
| Answer Call (CA-ANSCL) |
| **Call Processing** |
| Determine Nature of the Emergency (CP-DTNAT) |
| Determine and Verify Location of the Emergency (CP-VFLOC) |
| Identify Appropriate Responding Agency or Service (CP-IDRES) |
| Provide Pre-Arrival Instructions to Caller (CP-PRINS) |
| Establish Conference Call (CP-ECONF) |
| **Call Records Management** |
| Obtain Supportive or Supplemental Data Post Call Delivery (CR-OSSDT) |
| **Geospatial Visualization** |
| Display Geospatial Visualization (GV-DSGEO) |
| Manipulate Geospatial Data (GV-MPGEO) |

### Requirements

Key NG9-1-1 requirements addressed by the Multimedia Displays section ensure that the HMI display displays a variety of multimedia calls (image, SMS, and video) to the call taker. This section also describes how the call taker will be able to respond to TTY/TDD calls and manipulate multi-media controls. A complete list of requirements addressed by the Multimedia Displays section and its Pop-Up screens is provided in Appendix D—Requirements Traceability Matrix.

### 4.6.1 Multimedia Display Pop-Up—TTY/TDD/Text Messaging

This Pop-Up is activated when either a TTY/TDD incoming 9-1-1 call is answered or a text message call is received by the call taker. If it is a TTY/TDD call or a form of text

messaging that permits two-way conversation, the Pop-Up will display the ongoing line-by-line conversation with the caller and call taker individual messages identified with a front tag of caller or call taker. The Pop-Up will give the call taker the ability to scroll back in the conversation (with the up arrow in the upper right of the Pop-Up) and when applicable, forward (with the down arrow, lower right of the Pop-Up).

If the call is a text message that does not include two-way conversation, the Pop-Up will display the message. If the message length is greater than the display area, the Pop-Up will also allow the call taker to scroll up and down in the message (up/down arrows on upper/lower right side). Figure 4.24 shows the layout of the TTY/TDD/Text Messaging Pop-Up screen.

**Figure 4.24—TTY/TDD/Text Messaging Pop-Up Screen Layout**



### 4.6.2 Multimedia Display Pop-Up—Image

The Image Multimedia Pop-Up is activated when an image attachment has been received as part of the initiation of the call or received during the call. Various buttons on the Pop-Up will allow the call taker to (1) increase/decrease brightness, (2) zoom in/zoom out and (3) move up/down, left/right to view image if it has been magnified and is larger than the actual screen size. Figure 4.25 shows the layout of the Multimedia Image Pop-Up screen.

**Figure 4.25—Image Pop-Up Screen Layout**



### 4.6.3  Multimedia Display Pop-Up—Video/Interactive Video

The Video/Interactive Video Pop-Up is activated when either a video attachment has been received as part of the initiation of the call or is received during the call from caller, or when an interactive video call has been answered by the call taker.

The Video/Interactive Video Pop-Up contains five buttons for video play, pause, stop, fast forward, and rewind. Below them are buttons to decrease/increase volume (if sound is included) and to decrease/increase brightness buttons.  Additional features of the display allow the call taker to zoom in/zoom out and move up/down and left/right to view video if it has been magnified and is larger than the actual screen size.  Figure 4.26 shows the layout of the Video/Interactive Video Multimedia Pop-Up.

**Figure 4.26—Video/Interactive Video Pop-Up Layout**



The NG9-1-1 will allow a particular type of call to be directed to a specific call taker. For example, a speech or hearing impaired caller using video can be directed to a call taker trained to interact with a sign language interpreter. The call taker will be able to activate the interactive video call with the caller by selecting the Activate Web Cam button. Upon selection, a live video session between the call taker and caller will be initiated in which the call taker will carry on a dialogue with the interpreter who will converse with the caller using sign language. In this situation, although the call taker may not understand sign language, there is an opportunity to see the caller and the surrounding environment, which, in some cases, is as important as what the caller is reporting.

## 4.6.4 Multimedia Display Pop-Up—Call Interpreter

The call taker will be able to request the assistance of a trained sign language interpreter by selecting a conference call button. The Call Interpreter Multimedia Pop-Up is the only multimedia data Pop-Up that will populate the Additional Information Pop-Up Section 2 in order to ensure that the call taker will always remain in communication with the caller. The Call Interpreter Pop-Up can also be moved around the HMI Main Console display and resized if the call taker needs to access additional information during the time of the call (i.e., SOPs, Scripting, etc.). Figure 4.27 show the layout of the Call Interpreter Multimedia Pop-Up screen.

**Figure 4.27—Call Interpreter Multimedia Display**



### 4.6.5  Multimedia Data Main Display

When another full screen beyond the HMI Main Console is available, it can be used for full-screen multimedia display.  The Multimedia display screens are activated when a multimedia call or multimedia data supporting a call is received.

The following Multimedia displays have been identified and could be shown on this full screen:

- TTY/TDD/Text Messaging (as described in Section 4.6.1, shown in Figure 4.24)
- Image (as described in Section 4.6.2, shown in Figure 4.25)
- Video/Interactive Video (as described in Section 4.6.3, shown in 4.26)
- Call Interpreter (as described in Section 4.6.4, shown in 4.27).

If any interactive video call is being displayed and a call interpreter display is also needed, this screen would be split between two appropriate windows for those functions.

### 4.7 Additional Information Display

The Additional Information Pop-Up Section 2 is designated to display supporting and supplementary data as well as other tools that may be needed by the call taker during a call.  This information includes Supplementary and Supporting data, Caller History, Additional Addresses, Additional Call Data, Telematics Information, Scripting, Response Agencies details and listing, SOPs, Helpful Links, and other "Additional Information" displays identified for the HMI.  This information is presented via Pop-Up messages.  Call takers will likely have a number of such Pop-Up messages open at once because the screens will be presented as overlaying tabs.  The active tab (the one currently being

viewed) will be highlighted, and the deactivated tabs will be grayed out.  To view a specific tab, the call taker will click on the tab of interest.

In this document, the HMI Additional Information Pop-Up screens are addressed in detail within the description of the HMI sub-sections to which they belong.

## 4.8 Map Display

The Map display is updated when an incoming emergency call is received by the PSAP system.  It also is updated when a call taker enters a new/altered emergency location that is different than the location of the caller.

A number of mapping products are available to PSAPs today. These have an extensive array of functions and capabilities.

Such products will need to be altered/upgraded in order to receive, process, and display a call as it is received by the PSAP system.  In existing environments, calls are displayed after they are answered and are processed by call takers regarding emergency location acquisition and verification.  The call displays could include icons that help identify locally identified important call type information.

The following requirements are related to the Mapping display.  A variety of existing mapping products in use today in the PSAP/public safety communications environment already meet the requirements.  The key difference is that initial call display is predicated on the PSAP system reading the call's accompanying data, rather than initial call display resulting from a call taker answering and processing of a call.

# 5    HMI DISPLAY INTERFACE SPECIFICATIONS AND DEPLOYMENT CONSIDERATIONS

The following section provides interface, hardware, and software design specifications for the HMI display implementation.  The section also discusses deployment considerations of the HMI display.

## 5.1 HMI Design Interface, Hardware, and Software Specifications

With the implementation of the NG9-1-1 system, improvements to the technology infrastructure will allow PSAPs to operate in an environment that enables communication with callers via a wide variety of displays and communication types (voice, wireless, image, etc.).  The HMI display will provide a single point of contact to handle emergency calls through multiple channels.  The NG9-1-1 System will allow PSAPs to retain and leverage caller and operations data used to continuously improve processes and services.  The following section identifies Design Interface, Hardware, and Software specifications.

### 5.1.1  Interface Specifications

The HMI display will interface with internal PSAP (CAD, Mapping) and external (Location Databases, EPAD) systems.  The HMI display will incorporate additional detail from these systems and enhance services to provide improved emergency support to the public.  The NG9-1-1 System will require continued development of integration between the HMI and the internal/external systems and services.  Going forward, it is important that standards be developed in order to minimize any complexities and difficulties related to this integration.  One of the key features of the NG9-1-1 environment is the module-based infrastructure.  This allows a PSAP to subscribe to services that will provide features, functions, and data that have not been used before in providing 9-1-1.

Each of these services may have its own programming and screens.  The HMI design cannot address these interfaces in detail because many have not been developed, and they will be proprietary to the service providers.  For this part of the detailed design, several of the services that will be needed are listed as examples.  This list is not complete, but is used as reference.

These will most likely be Pop-Up type windows that the HMI software calls requesting other programs to open a screen in the interfaced system or program, i.e., like a secure web page to access medical information.

Table 5.1 outlines some of the interfaces that could be required for the call termination equipment.

**Table 5.1—Call Termination Equipment Interface Specifications**

| Service | Interface Type | Explanation |
|---------|----------------|-------------|
| Mapping (GIS) Interface | Two-Way | Displays the locations of contacts on a geographic display an electronic map is needed.  This interface would be required to send callers' data to the GIS for display and to receive responder data from the GIS. |
| Call Record Interface | Two-Way | Sends a record of actions and information entered by the call taker.  This would also contain the history files for the caller's history screen and queries. |
| Location Information Server (LIS) | Two-Way | Sends the data to the HMI on the location of the caller but will also need to be queried for updates and in the event the contact arrives at the PSAP from other sources without data. |
| Call Handling Scripts | Two-Way | Display to the call taker but often also store the data entered for quality assurance of the process. |
| Hospital | Two-Way | Queries for information and reads data from that query |
| SIP Client | Two way | Receives data stream with the call and adds data to the HMI call controls. |

## 5.1.2  Software Specifications

This document outlines the detailed design of the HMI software.  The HMI software provides a common platform for the PSAP's integration with the NG9-1-1 system.  This still permits PSAPs to use their own integrated software if they chose.

This software is modular in nature to allow the system to access various sources.  The basic functionality of the system will be in the HMI software but will also have APIs to other systems and services as discussed above.

## 5.1.3  Hardware Specifications

For the POC, PSAP call termination equipment will be a standard IP application and a workstation that will receive emergency call information from the caller using voice, video, and data (text, IM) technologies.  The Session Initiation Protocol (SIP) proxy server on the NG9-1-1 Network will handle the delivery of the call and route it to the appropriate call termination equipment.  In the NG9-1-1 environment, PSAPs may elect to deploy a standard IP-based phone device (like the Cisco 7960G IP phone set) as a backup solution in case the call taker's workstation or software application should fail.  Although not all the NG9-1-1 multimedia features would be available on this device, the call taker could continue to take voice calls in this degraded state.

The HMI software will be loaded on a workstation for use by the call taker.  The basic HMI screen design can be used on a single monitor display (standard for many PSAPs), with a second screen to display the mapping.  A third monitor is recommended to better display the interactive media.  Typically, the physical space on a PSAP call taker's console is limited.  However, having three screens will increase the flexibility and usability of the software application because the user will not need to switch back and forth between applications.  As a result, the call taker will be able to view more information simultaneously.

Table 5.2 lists examples of this hardware.

**Table 5.2—Call Termination Equipment Hardware Specifications**

| Sub-Component | Specifications |
|---|---|
| Base Unit: | Microsoft Windows-compliant PC |
| Processor: | Intel Core Duo 1.66 GHz |
| Memory: | 2 GB |
| Hard Drive: | 80 GB 5,400 rpm |
| NIC: | 100 Base T—Ethernet NIC |
| CD-ROM drive: | CD-RW/DVD Combo |
| Monitor | 19" Wide Screen LCD Monitor |

## 5.2 HMI Display Deployment Considerations

In the existing PSAP environment, technology and legacy system limitations may limit the capabilities of the HMI display and NG9-1-1 operations. It is important that the HMI display implementation at each location consider the constraints of the site to ensure that the HMI display functions appropriately. The following items have been identified as potential constraints that may minimize the effectiveness of the HMI display at a PSAP:

- CAD, Mapping, Dispatch, and other application screens are not standardized across PSAPs. At each location, call takers may see a different presentation of information for the emergency calls. Some PSAPs allow call takers to configure their screen individually. The HMI display should be able to integrate with most screens and systems that are used at the PSAP locations. The display should support appropriate receiving (responding) Police/Fire/and EMS agencies and should be easily usable by call takers.

- Call takers operate a variety of screens when responding and processing calls, including screen(s) for CAD, Mapping/GIS, Radio Dispatch, and other screens depending on location. Often, the screens are not integrated. Furthermore, these public safety systems (CAD/GIS) may not be compatible with the HMI design.

- Most PSAPs generally do not have the capability to receive SMS, image, or video calls. Call takers may not be able to easily identify the call emergency for issues received via new communication types, in particular because they are already using a number of screens and technologies.

- PSAPs may not be able to process some of the next generation multimedia communication types because of bandwidth limitations. Prior to deploying NG9-1-1 systems at the PSAPs, an assessment of the PSAPs network infrastructure should be conducted to ensure that it can seamlessly support NG9-1-1 applications and to minimize the impact of bandwidth limitations on PSAPs' ability to receive and process image and video streams. Data from network management systems should be analyzed to determine capacity requirements, and any network limitations should be identified and addressed prior to implementation of HMI at the PSAP.

## 5.3 HMI Display Deployment Considerations for the USDOT POC

As a part of the POC, the development team will create the HMI Display, which will support some of the identified design functionality (See Appendix E—HMI Deployment for POC for a complete list of functionality that will be included for the POC). The development team, after the display is developed, will conduct a variety of testing activities, including verification testing and user acceptance testing, to ensure that the HMI display is user friendly and fulfills the needs of call takers. The Deployment Plan deliverable will contain additional information about testing and deployment activities outlined for implementation of the NG9-1-1 HMI.

## APPENDIX A:    ACRONYMS

| Acronym | Description |
|---------|-------------|
| ACD | Automated Call Distribution |
| ACN | Automatic Crash Notification |
| ALI | Automatic Location Information |
| ANI | Automatic Number Identification |
| API | Application Programming Interface |
| CAD | Computer Aided Dispatch |
| E9-1-1 | Enhanced 9-1-1 |
| ECC | Emergency Call Center |
| EMS | Emergency Medical Services |
| EPAD | Emergency Provider Access Directory |
| GIS | Geographic Information System |
| GUI | Graphical User Interface |
| GV | Geospatial Visualization |
| HMI | Human Machine Interface |
| IM | Instant Messaging |
| IP | Internet Protocol |
| LIS | Location Information Server |
| MPC | Mobile Positioning Center |
| MRV | Multidimensional Requirements View |
| NENA | National Emergency Number Association |
| NG9-1-1 | Next Generation 9-1-1 |
| PBX | Private Branch Exchange |
| POC | Proof of Concept |
| PSAP | Public Safety Answering Point |
| PSTN | Public Switched Network |
| RMS | Records Management System |
| SIP | Session Initiation Protocol |
| SME | Subject Matter Expert |
| SMS | Short Message Service |
| SOP | Standard Operating Procedure |
| SR | Selective Routing |
| TDD | Telecommunication Device for the Deaf |
| TTY | Teletypewriter |
| UCD | User-Centered Design |
| URL | Universal Resource Locator |
| USDOT | U.S. Department of Transportation |
| XML | eXtensible Markup Language |

# APPENDIX B:   GLOSSARY

| Term | Definition |
|---|---|
| 9-1-1 | A three-digit telephone number to facilitate the reporting of an emergency requiring response by a public safety agency. |
| Analog | Continuous and variable electrical waves that represent an infinite number of values; as opposed to digital. |
| Authentication | Determination or verification of a user's identity and/or the user's eligibility to access to a system, network, or data; measures to prevent unauthorized access to information and resources. |
| Automatic Call Distributor (ACD) | Equipment or application that automatically distributes incoming calls to available PSAP attendants in the order the calls are received, or queues calls until an attendant becomes available. |
| Automatic Location Information (ALI) | The automatic display at the PSAP of the caller's telephone number, the address or location of the telephone, and supplementary emergency services information. |
| Automatic Number Identification (ANI) | Telephone number associated with the access line from which a call originates. |
| ANI key | A value that is used to correlate the number identified for the call with a query that determines the caller's location via Automatic Location Identification (ALI). |
| Bandwidth | Capacity of a network line to transfer data packets (includes speed of transfer and number of packets processed per second). |
| Call | For the purposes of this *NG9-1-1 System Description and High-Level Requirements Document*, any real-time communication—voice, text, or video—between a person needing assistance and a PSAP call taker.  This term also includes non-human-initiated automatic event alerts, such as alarms, telematics, or sensor data, which may also include real-time communications. |
| Call Back | The ability to re-contact the calling party. |
| Call Delivery | The capability to route a 9-1-1 call to the designated selective router for ultimate delivery to the designated PSAP for the caller's Automatic Number Identification (ANI) key. |
| Call Detail Record | All system (including network) data accessible with the delivery of the call, and all data automatically added as part of call processing.  This includes Essential Data (including reference key to network component and call progress records) and Supportive Data.  Part of the Call Record. |
| Caller Location Information | Data pertaining to the geospatial location of the caller, regardless of whether the caller is a person or an automatic event alert system. |
| Call Recording | The electronic documentation of the interactive communication (e.g., audio, video, text, image) between the caller, call taker, and any conferenced parties.  Part of the Call Record. |

| Term | Definition |
|---|---|
| Call Routing | The capability to selectively direct the 9-1-1 call to the appropriate PSAP. |
| Call Taker | As used in 9-1-1, a person (sometimes referred to as a telecommunicator) who receives emergency and non-emergency calls by telephone and other sources, determines situations, elicits necessary information, and relays essential information to dispatches, staff, and other agencies, as needed, using telephony and computer equipment. |
| Call Transfer | The capability to redirect a call to another party. |
| Call Type | Classification of a 9-1-1 call that indicates the call access method, which can affect call treatment, routing, and processing. Call types may include voice caller, short message service (SMS) text, Simple Mail Transfer Protocol (SMTP) text, multimedia, telematics data, ANI, silent alarms, etc. |
| Computer Aided Dispatch (CAD) system | A software package that utilizes a variety of displays and tools that allows Call Takers at the PSAP locations to dispatch emergency services (Police, Fire, Emergency Medical Service) to the identified emergency location. CAD uses a variety of communication types to dispatch a unit (paging, SMS, radio, etc.). |
| Customer Premises Equipment (CPE) | Communications or terminal equipment located in the customer's facilities; terminal equipment at a PSAP. |
| Dispatch Operations | The distribution of emergency information to responder organizations responsible for delivery of emergency services to the public. |
| Emergency Call | A telephone request for public safety agency emergency services that requires immediate action to save a life, to report a fire, or to stop a crime. May include other situations as determined locally. |
| Emergency Location Information | Data pertaining to the location of the emergency, which may be different from the caller location. |
| Emergency Medical Service (EMS) | A system providing pre-hospital emergency care and transportation to victims of sudden illness or injury. |
| Emergency Response | An effort by public safety personnel and citizens to mitigate the impact of an incident on human life and property. |
| Enhanced 9-1-1 (E9-1-1) | An emergency telephone system that includes network switching, database, and Customer Premises Equipment (CPE) elements capable of providing selective routing, selective transfer, fixed transfer, caller routing and location information, and ALI. |
| Essential Data | Data that support call delivery and adequate response capability. These data, or references to them, are automatically provided as a part of call or message initiation. Examples include location, call back data, and call type. |
| Human Machine Interface (HMI) | HMI enables direct interaction between the end-user (human) and a system (computer, machine) via commands and inputs, and receives an output from the system based on specified criteria. |

| Term | Definition |
| --- | --- |
| Human Machine Interface (HMI) Display | Graphical and visual user screen through which call takers (end-users) are able to manipulate a system. |
| Geographic Information System (GIS) | A computer software system that enables one to visualize geographic aspects of a body of data. It contains the ability to translate implicit geographic data (such as a street address) into an explicit map location. It has the ability to query and analyze data in order to receive the results in the form of a map. It also can be used to graphically display coordinates on a map (i.e., latitude/longitude) from a wireless 9-1-1 call. |
| IP Telephony | The electronic transmission of the human voice over IP Protocol, using data packets. |
| Internet Protocol (IP) | The set of rules by which data are sent from one computer to another on the Internet or other networks. |
| Interoperability | The capability for disparate systems to work together. |
| Interrogation Questions | Questions that Call Takers ask callers during an emergency call to obtain additional information. |
| Multi-Media Communication Types | Communication mediums that will be used to receive emergency requests from the public, including text, images, and video. |
| Navigation Menu | A tool used by a variety of computer systems that contains links to the features and applications available in the system, and allows end-users to access the applications by selecting the feature. Generally is grouped via links / hyperlinks to the application. |
| Nature of Emergency | Reason for a citizen's request for response from emergency services (e.g., heart attack, vehicle collision, burglary) |
| Network | An arrangement of devices that can communicate with each other. |
| Public Safety Answering Point (PSAP) | A facility equipped and staffed to receive 9-1-1 calls; a generic name for a municipal or county emergency communications center dispatch agency that directs 9-1-1 or other emergency calls to appropriate police, fire, and emergency medical services agencies and personnel. |
| Records Management System (RMS) | A computer software system that enables the storage or archival of data records related to public safety (e.g., 9-1-1 call logs, incident information, cases). |
| Router | An interface device between two networks that selects the best path to complete the call even if there are several networks between the originating network and the destination. |
| Screen Aesthetics | Look and Feel of the Human Machine Interface. This includes fonts, color schemes, and display layout. |
| Selective Routing (SR) | Direction of a 9-1-1 call to the proper PSAP based on the location of the caller. |

| Term | Definition |
|---|---|
| **Selective Transfer** | The capability to convey a 9-1-1 call to a response agency by operation of one of several buttons typically designated as police, fire, and emergency medical. |
| **Service Provider** | An entity providing one or more of the following 9-1-1 elements: network, Customer Premises Equipment (CPE), or database service. |
| **Short Message Service (SMS)** | A text message service that enables messages generally no more than 140–160 characters in length to be sent and transmitted from a cellular telephone. Short messages are stored and forwarded at SMS centers, allowing their retrieval later if the user is not immediately available to receive them. |
| **Supportive Data** | Information beyond essential data that may support call handling and dispatch. The addition of this data to the call stream is triggered by one or more of the data or reference items in essential data for a given call type. An example is Automatic Crash Notification (ACN) data such as "vehicle rollover." |
| **Supplemental Data** | Information that may complement, but is not necessary for, call handling and dispatch or emergency response. |
| **Telematics** | The system of components that supports two-way communications with a motor vehicle for the collection or transmission of information and commands. |
| **User Centered Design (UCD)** | Design principle that enable the development of a computer system based on the needs, wants, and limitations of the end user, including intuitive navigation, simplicity and consistency of information presentation, accessibility of information, visibility of key functional and navigational elements, and legible visual design. |
| **Voice over Internet Protocol (VoIP)** | A set of rules that provides distinct transfer of voice information in digital format using the Internet Protocol. The IP address assigned to the user's telephone number may be static or dynamic. |
| **Wireless** | In the telecommunications industry, typically refers to mobile telephony and communications through handheld devices that make a connection using radio frequency (in particular frequency bands often reserved for mobile communications) for personal telecommunications over long distances. |
| **Wireline** | Standard telephone and data communications systems that use in-ground and telephone pole cables. Also known as landline or land-based. |

# APPENDIX C: SOURCE REFERENCES

The following documents are primary sources of information used in this document.

1. *Next Generation 9-1-1 (NG9-1-1) System Initiative: Concept of Operations.* USDOT ITS JPO. April 2007. http://www.its.dot.gov/press/pdf/911_network.pdf —This is a formal document that provides a user-oriented vision of NG9-1-1 in the context of an emergency services internet work that can be understood by stakeholders with a broad range of operational and technical expertise. It is intended to communicate the vision of this system to stakeholders so that they can be actively engaged in its development and deployment.

2. *Next Generation 9-1-1 (NG9-1-1) System Initiative: System Description and Requirements Document.* USDOT ITS JPO. November 2007. http://www.its.dot.gov/ng911/pdf/NG911_HI_RES_Requirements_v2_20071010.pdf —This is a formal document that provides an overview of NG9-1-1 System Operations and requirements.

3. *Next Generation 9-1-1 (NG9-1-1) Architecture Analysis Document.* November 2007. http://www.its.dot.gov/ng911/pdf/1.F2_FINAL_MED_ArchitectureAnalysis_v1.0.pdf —This is a formal document that provides an architectural Analysis for the Next Generation 9-1-1 (NG9-1-1) System (or "system of systems") and presents an evolved 9-1-1 architecture able to support next generation technologies, access methods, and operational capabilities.

4. *User-Centered Design.* IBM Methodology for User–Centered Design—http://www-03.ibm.com/easy/page/570—This website outlines principles and methodologies for user centric design and processes.

# APPENDIX D:    REQUIREMENTS TRACEABILITY MATRIX

The Requirements Traceability Matrix for the HMI Display contains Tier 1 system, data, and functional requirements identified for the HMI Display that were extracted from the requirements repository. Requirements are grouped based on the section of the HMI display where they are addressed. The Compliance column provides a short summary of how the requirement is addressed to further illustrate compliance of the HMI display design with the NG9-1-1 System Definition. ACD Rules and General System requirements are not included in this appendix because they are back-end support considerations and are not a part of the interface itself. This appendix contains requirements for the following sections: Caller Information Sub-section, Emergency Location Information Sub-section, Telephone Controls and ACD Display Sub-section, Links, Multi-media Display, and the Map Display.

## Caller Information Requirements

The Caller Information section is designed in accordance with the following requirements identified for the NG9-1-1 System.

| Service Area Code | Activity Code | Role | Requirement Code | Requirement Text | Document Section | Compliance |
|---|---|---|---|---|---|---|
| CR | OSSDT | CT | OSSDT-FR-01 | The system shall provide the capability for a call taker to access Supplemental Data. | Caller Information (Section 4.2) | Additional information about the call is contained in the Additional Call Data tab, which is accessible via the Additional Call Data Button. |
| CR | OSSDT | CT | OSSDT-FR-02 | The system shall provide the capability for a call taker to access Supportive Data. | Caller Information (Section 4.2) | Additional information about the call is contained in the Additional Call Data tab, which is accessible via the Additional Call Data Button. |
| CP | DTNAT | CT | DTNAT-FR-08 | The system shall provide the capability to read call records. | Caller Information (Section 4.2) | The Caller History Tab, accessible via the Caller History Button contains all caller history records. Call taker can view Call Record details (Call Record tab) for each call. Call Record tab may also be accessible from the ACD display section. |
| CA | MNQUE | CT | MNQUE-FR-11 | The system shall make previous call history available to the call taker based on the telecommunications device number. | Caller Information (Section 4.2) | The Caller History is available from the Call History Pop-Up, accessible via the Caller History button. The Pop-Up will provide a snapshot of caller history (from the CAD). |
| CP | UCLOC | CT | UCLOC-DR-05 | The system shall support the following representations of location information for a mobile device: a) latitude, b) longitude, c) altitude, and d) floor designation. | Caller Information (Section 4.2) | The Caller Information section contains fields associated with the location, contact information, service provider, and latitude and longitude information for the caller. |
| CA | MNQUE | CT | MNQUE-SR-10 | The system shall populate Call Taker's display with call detail information. | Caller Information (Section 4.2) | The Caller Information section contains fields associated with the location, contact information, service provider, and latitude and longitude information for the caller. |

*Emergency Information Requirements*
The Emergency Information section is designed in accordance with the following requirements identified for the NG9-1-1 System.

| Service Area Code | Activity Code | Role | Requirement Code | Requirement Text | Document Section | Compliance |
|---|---|---|---|---|---|---|
| DM | SCIER | CT | SCIER-SR-07 | They system shall pre-populate the location discrepancy report with the incorrect information. | Emergency Information (Section 4.3) | The Discrepancy tab, accessible via the Discrepancy button, allows the call taker to document and submit incorrect caller information. Discrepancy Report will be pre-populated with the initially received caller data. |
| DM | SCIER | CT | SCIER-FR-01 | The system shall provide the capability to document incorrect caller information. | Emergency Information (Section 4.3)) | The Discrepancy tab, accessible via the Discrepancy button, allows the call taker to document and submit incorrect caller information. Discrepancy Report will be pre-populated with the initially received caller data. |
| DM | SCIER | CT | SCIER-FR-03 | The system shall provide the capability for the user to submit a discrepancy report for correction. | Emergency Information (Section 4.3) | The Discrepancy tab, accessible via the Discrepancy button allows the call taker to document and submit incorrect caller information. Discrepancy Report will be pre-populated with the initially received caller data. |
| CP | VFLOC | CT | VFLOC-FR-05 | The system shall provide the capability to document incorrect location information for correction. | Emergency Information (Section 4.3) | The Discrepancy tab, accessible via the Discrepancy button allows the call taker to document and submit incorrect caller information. Discrepancy Report will be pre-populated with the initially received caller data. |
| DM | SCIER | CT | SCIER-FR-02 | The system shall pre-populate the discrepancy report with the associated source data. | Emergency Information (Section 4.3) | The Discrepancy tab, accessible via the Discrepancy button allows the call taker to document and submit incorrect caller information. Discrepancy Report will be pre-populated with the initially received caller data. |
| DM | SCIER | CT | SCIER-FR-06 | The system shall pre-populate the location discrepancy report with caller identification information. | Emergency Information (Section 4.3) | The Discrepancy tab, accessible via the Discrepancy button allows the call taker to document and submit incorrect caller information. Discrepancy Report will be pre-populated with the initially received caller data. |
| CP | IDRES | CT | IDRES-FR-04 | The system shall provide the capability to transmit a call record to the selected responder agencies' dispatchers. | Emergency Information (Section 4.3) | The Dispatch button allows the call taker to send information to the appropriate Response Agency dispatcher. |
| CR | TRCIN | CT | TRCIN-FR-01 | The system shall provide the capability to transfer a call record. | Emergency Information (Section 4.3) | The Dispatch button allows the call taker to send information to the appropriate Response Agency dispatcher. Also, the Share Data button of the Call Record tab allows the call taker to share the record with an appropriate agency. |
| CP | DTNAT | CT | DTNAT-FR-05 | The system shall provide the capability to update the nature of the emergency. | Emergency Information (Section 4.3) | Emergency Type and Emergency Secondary Type allow call takers to enter and document the emergency type for each call. |

| Service Area Code | Activity Code | Role | Requirement Code | Requirement Text | Document Section | Compliance |
|---|---|---|---|---|---|---|
| CP | VFLOC | CT | VFLOC-SR-02 | The system shall provide the call taker with a capability to document the location of the emergency. | Emergency Information (Section 4.3) | Emergency Location can be added by call taker to the Emergency Location fields. This is pre-populated with information from the Caller Information section by default. |
| CP | DTNAT | CT | DTNAT-FR-01 | The system shall provide the capability to document the nature of the emergency for each call. | Emergency Information (Section 4.3) | Emergency Type and Emergency Secondary Type allow call takers to enter and document the emergency type for each call. |
| CP | DTNAT | CT | DTNAT-FR-02 | The system shall provide the capability to document additional information for a call. | Emergency Information (Section 4.3) | The Notes Pad section allows to document additional information for the call. |
| CP | IDRES | CT | IDRES-SR-01 | The system shall display the emergency responder agencies associated with the emergency location. | Emergency Information (Section 4.3) | The Responder Agency list is available to the call taker from the Emergency Information sub-section. The agencies are selected based on the Emergency Location and Type fields. The call taker can also view Agency Detail and search for Agencies from the Responder Agencies tab, accessible via the Responder Agency button. |
| CP | IDRES | CT | IDRES-SR-01-01 | The system shall display the emergency responder agencies associated with the caller location if the emergency location is not available. | Emergency Information (Section 4.3) | The Responder Agency list is available to the call taker from the Emergency Information sub-section. The agencies are selected based on the Emergency Location and Type fields. The call taker can also view Agency Detail and search for Agencies from the Responder Agencies tab, accessible via the Responder Agency button. |
| CP | IDRES | CT | IDRES-SR-01-02 | The system shall display the emergency responder agencies associated with the nature of emergency (that is, recommended responders). | Emergency Information (Section 4.3) | The Responder Agency list is available to the call taker from the Emergency Information sub-section. The agencies are selected based on the Emergency Location and Type fields. The call taker can also view Agency Detail and search for Agencies from the Responder Agencies tab, accessible via the Responder Agency button. |
| CP | IDRES | CT | IDRES-SR-01-03 | The system shall display the emergency responder agencies associated with the Call Type if nature of emergency is not available. | Emergency Information (Section 4.3) | The Responder Agency list is available to the call taker from the Emergency Information sub-section. The agencies are selected based on the Emergency Location and Type fields. The call taker can also view Agency Detail and search for Agencies from the Responder Agencies tab, accessible via the Responder Agency button. |
| CP | IDRES | CT | IDRES-SR-01-06 | The system shall display the mode of communication capabilities of the displayed responder agencies. | Emergency Information (Section 4.3) | The Responder Agency list is available to the call taker from the Emergency Information sub-section. The agencies are selected based on the Emergency Location and Type fields. The call taker can also view Agency Detail and search for Agencies from the Responder Agencies tab, accessible via the Responder Agency button. |

| Service Area Code | Activity Code | Role | Requirement Code | Requirement Text | Document Section | Compliance |
|---|---|---|---|---|---|---|
| CP | IDRES | CT | IDRES-FR-02 | The system shall provide the capability to refresh the list of responders. | Emergency Information (Section 4.3) | The Responder Agency list is available to the call taker from the Emergency Information sub-section. The agencies are selected based on the Emergency Location and Type fields. The call taker can also view Agency Detail and search for Agencies from the Responder Agencies tab, accessible via the Responder Agency button. |
| CP | IDRES | CT | IDRES-FR-03-01 | The system shall provide the capability to select individual agents within a responding agency. | Emergency Information (Section 4.3) | The Responder Agency list is available to the call taker from the Emergency Information sub-section. The agencies are selected based on the Emergency Location and Type fields. The call taker can also view Agency Detail and search for Agencies from the Responder Agencies tab, accessible via the Responder Agency button. |
| CP | IDRES | CT | IDRES-FR-05 | The system shall provide the capability to search the responder list. | Emergency Information (Section 4.3) | The Responder Agency list is available to the call taker from the Emergency Information sub-section. The agencies are selected based on the Emergency Location and Type fields. The call taker can also view Agency Detail and search for Agencies from the Responder Agencies tab, accessible via the Responder Agency button. |
| CP | IDRES | CT | IDRES-FR-05-01 | The system shall provide the capability to search the responder list using Boolean search terms. | Emergency Information (Section 4.3) | The Responder Agency list is available to the call taker from the Emergency Information sub-section. The agencies are selected based on the Emergency Location and Type fields. The call taker can also view Agency Detail and search for Agencies from the Responder Agencies tab, accessible via the Responder Agency button. |
| CP | IDRES | CT | IDRES-SR-07 | The system shall log the selected responder agencies for each call. | Emergency Information (Section 4.3) | The Responder Agency list is available to the call taker from the Emergency Information sub-section. The agencies are selected based on the Emergency Location and Type fields. The call taker can also view Agency Detail and search for Agencies from the Responder Agencies tab, accessible via the Responder Agency button. |
| CP | DTNAT | CT | DTNAT-SR-07 | The system shall display call handling procedures to a call taker. | Emergency Information (Section 4.3) | The SOPs and Scripting Pop-Ups are available to the call taker from the Emergency Information Sub-section to display call handling procedures to the call taker. |
| CP | IDRES | CT | IDRES-SR-01-05 | The system shall display call handling procedures based on business rules to the call taker. | Emergency Information (Section 4.3) | The SOPs and Scripting Pop-Ups are available to the call taker from the Emergency Information Sub-section to display call handling procedures to the call taker. |
| CP | PRINS | CT | PRINS-FR-01 | The system shall provide the capability for a call taker to select pre-arrival instruction based on the nature of the emergency. | Emergency Information (Section 4.3) | The SOPs and Scripting Pop-Ups are available to the call taker from the Emergency Information Sub-section to display call handling procedures to the call taker. |

| Service Area Code | Activity Code | Role | Requirement Code | Requirement Text | Document Section | Compliance |
|---|---|---|---|---|---|---|
| CP | PRINS | CT | PRINS-SR-02 | The system shall display pre-arrival instructions to the call taker. | Emergency Information (Section 4.3) | The SOPs and Scripting Pop-Ups are available to the call taker from the Emergency Information Sub-section to display call handling procedures to the call taker. |
| CP | PRINS | CT | PRINS-SR-03 | The system shall prioritize pre-arrival instructions based on a) essential or supportive data delivered with the call, b) supplemental information obtained subsequently, or c) information typed into the Call Record by the call taker. | Emergency Information (Section 4.3) | The SOPs and Scripting Pop-Ups are available to the call taker from the Emergency Information Sub-section to display call handling procedures to the call taker. |
| CA | ANSCL | CT | ANSCL-SR-15 | The system shall display the default call handling procedure based upon Call Type upon call answer. | Emergency Information (Section 4.3) | The SOPs and Scripting Pop-Ups are available to the call taker from the Emergency Information Sub-section to display call handling procedures to the call taker. |

## *Telephone Control and ACD Display Requirements*

The Telephone Controls and ACD Display section is designed in accordance with the following requirements identified for the NG9-1-1 system.

| Service Area Code | Activity Code | Role | Requirement Code | Requirement Text | Document Section | Compliance |
|---|---|---|---|---|---|---|
| CA | ANSCL | CT | ANSCL-FR-02 | The system shall provide the capability to answer an incoming call. | Telephone Controls / ACD Display (Section 4.5) | The Answer button will allow the call taker to pick up a call. Also, the call taker is able to pick up a call from the Call Queue tab. |
| CP | UCLOC | CT | UCLOC-FR-02 | The system shall provide the capability for a call taker to manually initiate a location update. | Telephone Controls / ACD Display (Section 4.5) | The Auto Locate Tab, accessible via the Auto Locate Button, allows the call taker to set up automated location parameters. |
| CP | UCLOC | CT | UCLOC-FR-02-01 | The system shall provide the capability for the call taker to manually initiate continuous location updates, at provider-defined update intervals. | T Telephone Controls / ACD Display (Section 4.5) | The Auto Locate Tab, accessible via the Auto Locate Button, allows the call taker to set up automated location parameters. |
| CP | UCLOC | CT | UCLOC-SR-07 | The system shall request updated caller location from a mobile call service provider at least every TBD-02 seconds. | Telephone Controls / ACD Display (Section 4.5) | The Auto Locate tab, accessible via the Auto Locate Button, allows the call taker to set up automated location parameters. |

| Service Area Code | Activity Code | Role | Requirement Code | Requirement Text | Document Section | Compliance |
|---|---|---|---|---|---|---|
| CP | UCLOC | CT | UCLOC-FR-03 | The system shall provide the capability to activate the automatic location update function on a call-by-call basis. | Telephone Controls / ACD Display (Section 4.5) | The Auto Locate tab, accessible via the Auto Locate Button, allows the call taker to set up automated location parameters. The tab is reset to default parameters after each call release. |
| CA | INTCB | CT | INTCB-FR-07 | The system shall provide the capability to establish a call path between a call taker and a telecommunications device if a call is abandoned before a call taker can answer the call. | Telephone Controls / ACD Display (Section 4.5) | The Call Back tab allows the call taker to select the communication method and the contact number for the call back. One or more call back numbers can be selected. |
| CP | ECONF | CT | ECONF-FR-01 | The system shall provide the capability to establish a call path to one or more telecommunication devices. | Telephone Controls / ACD Display (Section 4.5) | The Call Back tab allows the call taker to select the communication method and the contact number for the call back. One or more call back numbers can be selected. |
| CA | INTCB | CT | INTCB-FR-06 | The system shall provide the capability to reestablish a call path to a telecommunications device. | Telephone Controls / ACD Display (Section 4.5) | The Call Back tab allows the call taker to select the communication method and the contact number for the call back. One or more call back numbers can be selected. |
| CA | INTCB | CT | INTCB-FR-06-03 | The system shall display the supported call back communications methods to the call taker, when a call back has been requested. | Telephone Controls / ACD Display (Section 4.5) | The Call Back tab allows the call taker to select the communication method and the contact number for the call back. One or more call back numbers can be selected. |
| CA | INTCB | CT | INTCB-FR-06-04 | The system shall permit the call taker to select from the supported communications methods when initiating a call back. | Telephone Controls / ACD Display (Section 4.5) | The Call Back tab allows the call taker to select the communication method and the contact number for the call back. One or more call back numbers can be selected. |
| CP | ECONF | CT | ECONF-FR-13 | The system shall provide the capability to select a telecommunications device number from a list. | Telephone Controls / ACD Display (Section 4.5) | The Call Back tab allows the call taker to select the communication method and the contact number for the call back. One or more call back numbers can be selected. |
| CA | MNQUE | CT | MNQUE-FR-02 | The system shall display call queues. | Telephone Controls / ACD Display (Section 4.5) | The Call Queue tab allows the call taker to view call queue, pick up calls, and manage calls from the queue. The tab is accessible via the Call Queue button. |
| CA | MNQUE | CT | MNQUE-SR-04 | The system shall display the time a call was placed in queue. | Telephone Controls / ACD Display (Section 4.5) | The Call Queue tab allows the call taker to view call queue, pick up calls, and manage calls from the queue. The tab is accessible via the Call Queue button. |
| CA | MNQUE | CT | MNQUE-SR-04-01 | The system shall provide a visual warning that a call remains unanswered after TBD seconds. | Telephone Controls / ACD Display (Section 4.5) | The Call Queue tab allows the call taker to view call queue, pick up calls, and manage calls from the queue. The tab is accessible via the Call Queue button. |

| Service Area Code | Activity Code | Role | Requirement Code | Requirement Text | Document Section | Compliance |
|---|---|---|---|---|---|---|
| CA | MNQUE | CT | MNQUE-SR-04-02 | The system shall provide an audible warning that a remains unanswered after TBD seconds. | Telephone Controls / ACD Display (Section 4.5) | The Call Queue tab allows the call taker to view call queue, pick up calls, and manage calls from the queue. The tab is accessible via the Call Queue button. |
| CA | MNQUE | CT | MNQUE-SR-05 | The system shall display the time elapsed for a call in the queue. | Telephone Controls / ACD Display (Section 4.5) | The Call Queue tab allows the call taker to view call queue, pick up calls, and manage calls from the queue. The tab is accessible via the Call Queue button. |
| CA | ANSCL | CT | ANSCL-FR-09 | The system shall provide the capability for a call taker to select a call from a call queue. | Telephone Controls / ACD Display (Section 4.5) | The Call Queue tab allows the call taker to view call queue, pick up calls, and manage calls from the queue. The tab is accessible via the Call Queue button. |
| CA | ANSCL | CT | ANSCL-FR-11-01 | The system shall record the time a call is placed on hold. | Telephone Controls / ACD Display (Section 4.5) | The Call Queue tab allows the call taker to view call queue, pick up calls, and manage calls from the queue. The tab is accessible via the Call Queue button. |
| CA | ANSCL | CT | ANSCL-FR-12-01 | The system shall record the time a call taken off hold. | Telephone Controls / ACD Display (Section 4.5) | The Call Queue tab allows the call taker to view call queue, pick up calls, and manage calls from the queue. The tab is accessible via the Call Queue button. |
| CA | ANSCL | CT | ANSCL-SR-13 | The system shall display a time on hold alert after TBD-01 seconds. | Telephone Controls / ACD Display (Section 4.5) | The Call Queue tab allows the call taker to view call queue, pick up calls, and manage calls from the queue. The tab is accessible via the Call Queue button. |
| CA | ANSCL | CT | ANSCL-SR-13-01 | The system shall be configurable to specify the elapsed time before the "time on hold" alert will be generated. | Telephone Controls / ACD Display (Section 4.5) | The Call Queue tab allows the call taker to view call queue, pick up calls, and manage calls from the queue. The tab is accessible via the Call Queue button. |
| CA | ANSCL | CT | ANSCL-SR-13-02 | The system shall be configurable to deliver an audible and/or visual alert when the "time on hold" alert has been generated. | Telephone Controls / ACD Display (Section 4.5) | The Call Queue tab allows the call taker to view call queue, pick up calls, and manage calls from the queue. The tab is accessible via the Call Queue button. |
| CA | MNQUE | CT | MNQUE-SR-03 | The system shall display call queues by automatic call distributor (ACD) group. | Telephone Controls / ACD Display (Section 4.5) | The Call Queue tab allows the call taker to view call queue, pick up calls, and manage calls from the queue. The tab is accessible via the Call Queue button. |
| CA | ANSCL | CT | ANSCL-FR-09-01 | The system shall permit an authorized call taker to select any pending call from the queue. | Telephone Controls / ACD Display (Section 4.5) | The Call Queue tab allows the call taker to view call queue, pick up calls, and manage calls from the queue. The tab is accessible via the Call Queue button. |
| CA | ANSCL | CT | ANSCL-FR-12-02 | The system shall re-read and redisplay the call detail record each and every time a call is taken off hold. | Telephone Controls / ACD Display (Section 4.5) | The Call Record tab contains details about the call. Call taker is able to call queue details, caller location, emergency type, notes, responding agency, and multimedia data for each call. The tab can be accessed via the Call Record button. |

| Service Area Code | Activity Code | Role | Requirement Code | Requirement Text | Document Section | Compliance |
|---|---|---|---|---|---|---|
| CA | INTCB | CT | INTCB-FR-06-02 | The system shall provide the option to read from the call detail record database to display any supportive or supplemental data that exists that provides additional call back methods. | Telephone Controls / ACD Display (Section 4.5) | The Call Record tab contains details about the call. Call taker is able to call queue details, caller location, emergency type, notes, responding agency, and multimedia data for each call. The tab can be accessed via the Call Record button. |
| CA | INTCB | CT | INTCB-FR-06-05 | The system shall store the results of the call back attempt in the call detail record. | Telephone Controls / ACD Display (Section 4.5) | The Call Record tab contains details about the call. Call taker is able to call queue details, caller location, emergency type, notes, responding agency, and multimedia data for each call. The tab can be accessed via the Call Record button. |
| CP | UCLOC | CT | UCLOC-SR-04 | The system shall archive automatic location updates as part of the Call Record. | Telephone Controls / ACD Display (Section 4.5) | The Call Record tab contains details about the call. Call taker is able to call queue details, caller location, emergency type, notes, responding agency, and multimedia data for each call. The tab can be accessed via the Call Record button. Notes section will contain this data. |
| CP | UCLOC | CT | UCLOC-SR-04-01 | The system shall archive manual singular location updates as part of the Call Record. | Telephone Controls / ACD Display (Section 4.5) | The Call Record tab contains details about the call. Call taker is able to call queue details, caller location, emergency type, notes, responding agency, and multimedia data for each call. The tab can be accessed via the Call Record button. Notes section will contain this data. |
| CP | UCLOC | CT | UCLOC-SR-04-02 | The system shall archive manual continuous location updates as a part of the Call Record so the entire location history can be reconstructed. | Telephone Controls / ACD Display (Section 4.5) | The Call Record tab contains details about the call. Call taker is able to call queue details, caller location, emergency type, notes, responding agency, and multimedia data for each call. The tab can be accessed via the Call Record button. Notes section will contain this data. |
| CP | ECONF | CT | ECONF-FR-14 | The system shall store the results of the conference or transfer attempt in the call detail record. | Telephone Controls / ACD Display (Section 4.5) | The Call Record tab contains details about the call. Call taker is able to call queue details, caller location, emergency type, notes, responding agency, and multimedia data for each call. The tab can be accessed via the Call Record button. Notes section will contain this data. |
| CR | RCCAL | CT | RCCAL-FR-07-01 | The system shall provide the capability to display TBR previous Call Recording for instant playback | Telephone Controls / ACD Display (Section 4.5) | The Call Recording tab contains Call Recording and search functionality. The tab is accessible via the Call Recording button. |
| CR | RCCAL | CT | RCCAL-FR-09-01 | The system shall provide the capability to search the Call Recording database | Telephone Controls / ACD Display (Section 4.5) | The Call Recording tab contains Call Recording and search functionality. The tab is accessible via the Call Recording button. |
| CR | RCCAL | CT | RCCAL-FR-09-02 | The system shall provide the capability to retrieve call recording based upon search criteria. | Telephone Controls / ACD Display (Section 4.5) | The Call Recording tab contains Call Recording and search functionality. The tab is accessible via the Call Recording button. |

| Service Area Code | Activity Code | Role | Requirement Code | Requirement Text | Document Section | Compliance |
|---|---|---|---|---|---|---|
| CR | RCCAL | CT | RCCAL-FR-11 | The system shall provide the capability to display Call Recording | Telephone Controls / ACD Display (Section 4.5) | The Call Recording tab contains Call Recording and search functionality. The tab is accessible via the Call Recording button. |
| CR | RCCAL | CT | RCCAL-FR-11-01 | The system shall provide the capability to play the call recording | Telephone Controls / ACD Display (Section 4.5) | The Call Recording tab contains Call Recording and search functionality. The tab is accessible via the Call Recording button. |
| CR | RCCAL | CT | RCCAL-FR-11-02 | The system shall provide the capability to pause the Call Recording. | Telephone Controls / ACD Display (Section 4.5) | The Call Recording tab contains Call Recording and search functionality. The tab is accessible via the Call Recording button. |
| CR | RCCAL | CT | RCCAL-FR-11-03 | The system shall provide the capability to rewind the Call Recording | Telephone Controls / ACD Display (Section 4.5) | The Call Recording tab contains Call Recording and search functionality. The tab is accessible via the Call Recording button. |
| CR | RCCAL | CT | RCCAL-FR-11-04 | The system shall provide the capability to fast forward the Call Recording | Telephone Controls / ACD Display (Section 4.5) | The Call Recording tab contains Call Recording and search functionality. The tab is accessible via the Call Recording button. |
| CR | RCCAL | CT | RCCAL-FR-15 | The system shall provide the capability to monitor a call recording during a call. | Telephone Controls / ACD Display (Section 4.5) | The Call Recording tab contains Call Recording and search functionality. The tab is accessible via the Call Recording button. |
| CR | RCCAL | CT | RCCAL-FR-05 | The system shall provide the capability to access a Call Recording. | Telephone Controls / ACD Display (Section 4.5) | The Call Recording tab contains Call Recording capabilities. The tab is accessible via the Call Recording button. |
| CR | RCCAL | CT | RCCAL-SR-08 | The system shall link a Call Recording with its call record. | Telephone Controls / ACD Display (Section 4.5) | The Call taker can access Call Record associated with the Call Recording via the View Call Record button on the Call Recording Pop-Up. |
| CR | RCCAL | CT | RCCAL-FR-09 | The system shall provide the capability to retrieve a Call Recording with its Call Record. | Telephone Controls / ACD Display (Section 4.5) | The Call taker can access Call Record associated with the Call Recording via the View Call Recording button on the Call Record Pop-Up. |
| CA | ANSCL | CT | ANSCL-FR-17 | The system shall permit the Call Taker to indicate a status of "Not Ready" for the situation where the user is signed-on (but not available to answer queue calls). | Telephone Controls / ACD Display (Section 4.5) | The Change Status Drop-down allows the call taker to change his/her readiness status. |
| CP | ECONF | CT | ECONF-FR-08 | The system shall provide the capability to establish a call path to a third-party call center associated with the call. | Telephone Controls / ACD Display (Section 4.5) | The Conference feature allows the call taker to dial a third party during the call. |
| CP | ECONF | CT | ECONF-SR-09-01 | The system shall provide the capability to establish voice conferencing. | Telephone Controls / ACD Display (Section 4.5) | The Conference feature allows the call taker to establish voice conferencing. |

| Service Area Code | Activity Code | Role | Requirement Code | Requirement Text | Document Section | Compliance |
|---|---|---|---|---|---|---|
| CR | RCCAL | CT | RCCAL-FR-13 | The system shall provide the capability to retrieve a call recording after a call. | Telephone Controls / ACD Display (Section 4.5) | The Historic Call Recordings can be accessed either via Call Record or via Call Recording search. |
| CR | RCCAL | CT | RCCAL-FR-14 | The system shall provide the capability to retrieve a call recording during a call. | Telephone Controls / ACD Display (Section 4.5) | The Historic Call Recordings can be accessed either via Call Record or via Call Recording search. |
| CA | ANSCL | CT | ANSCL-FR-11 | The system shall provide the capability to place a call on hold. | Telephone Controls / ACD Display (Section 4.5) | The Hold button allows the call taker to place the caller on hold and take the caller off hold. |
| CA | ANSCL | CT | ANSCL-FR-12 | The system shall provide the capability to take a call off hold. | Telephone Controls / ACD Display (Section 4.5) | The Hold button allows the call taker to place the caller on hold and take the caller off hold. |
| CA | MNQUE | CT | MNQUE-FR-09 | The system shall provide the capability to notify a call taker that a call has arrived. | Telephone Controls / ACD Display (Section 4.5) | The Main Display will flash and beep when a new call has arrived. |
| CA | MNQUE | CT | MNQUE-FR-09-01 | The system shall provide the call taker with both an audible and visual alert when a call has arrived. | Telephone Controls / ACD Display (Section 4.5) | The Main Display will flash and beep when a new call has arrived. |
| CR | ENDCL | CT | ENDCL-FR-01 | The system shall provide the capability to terminate a call. | Telephone Controls / ACD Display (Section 4.5) | The Release key allows the call taker to end the call. |
| CR | RCCAL | CT | RCCAL-FR-06 | The system shall provide the capability to transfer a Call Recording with its Call Record to a third party. | Telephone Controls / ACD Display (Section 4.5) | The Share Data feature of the Call Record tab allows the call taker to share call record and the associated call recording with a third party. |
| CP | ECONF | CT | ECONF-FR-05 | The system shall provide the capability to store frequently used conference call participant numbers. | Telephone Controls / ACD Display (Section 4.5) | The Speed Dial keys contain all frequently dialed numbers. |
| CP | ECONF | CT | ECONF-DR-07 | The system shall provide the capability to store frequently used telecommunications device numbers. | Telephone Controls / ACD Display (Section 4.5) | The Speed Dial keys contain all frequently dialed numbers. |
| CP | ECONF | CT | ECONF-FR-12 | The system shall provide the capability to dial a telecommunications device number. | Telephone Controls / ACD Display (Section 4.5) | The Telephone Dial pad, Dial Button, and Speed Dial keys allow the call taker to dial a number. |

*Call Taker Helpful Links Requirements*
The Call Taker Helpful Links section is designed in accordance with the following requirements identified for the NG9-1-1 System.

| Service Area Code | Activity Code | Role | Requirement Code | Requirement Text | Document Section | Compliance |
|---|---|---|---|---|---|---|
| CR | OSSDT | CT | OSSDT-FR-03 | The system shall provide the capability to search Supportive Data. | Call Taker Helpful Links (Section 4.6) | The Queries tab will contain all queries available at the PSAP. The queries tab will be configurable at each location to include customized searches available at that location. |
| CR | OSSDT | CT | OSSDT-FR-04 | The system shall provide the capability to search Supplemental Data. | Call Taker Helpful Links (Section 4.6) | The Queries tab will contain all queries available at the PSAP. The queries tab will be configurable at each location to include customized searches available at that location. |
| CR | OSSDT | CT | OSSDT-SR-05 | The system shall display Supportive Data search results to the call taker, based on business rules. | Call Taker Helpful Links (Section 4.6) | The Queries tab will contain all queries available at the PSAP. The queries tab will be configurable at each location to include customized searches available at that location. |
| CR | OSSDT | CT | OSSDT-SR-05-01 | The system shall support queries of supportive data from internal systems, including: call stream data, call detail record data, and GIS. | Call Taker Helpful Links (Section 4.6) | The Queries tab will contain all queries available at the PSAP. The queries tab will be configurable at each location to include customized searches available at that location. |
| CR | OSSDT | CT | OSSDT-SR-05-02 | The system shall support queries of supportive data from external systems, including: medical records data and other data sources. | Call Taker Helpful Links (Section 4.6) | The Queries tab will contain all queries available at the PSAP. The queries tab will be configurable at each location to include customized searches available at that location. |
| CR | OSSDT | CT | OSSDT-SR-05-03 | The system shall support drill-down queries of supportive data to obtain additional detail | Call Taker Helpful Links (Section 4.6) | The Queries tab will contain all queries available at the PSAP. The queries tab will be configurable at each location to include customized searches available at that location. |
| CR | OSSDT | CT | OSSDT-SR-06 | The system shall display Supplemental Data search results to the call taker, based on business rules. | Call Taker Helpful Links (Section 4.6) | The Queries tab will contain all queries available at the PSAP. The queries tab will be configurable at each location to include customized searches available at that location. |
| CP | ECONF | CT | ECONF-FR-08-01 | The system shall provide the ability to query the EPAD database for emergency provider contact method and access data. | Call Taker Helpful Links (Section 4.6) | The Queries tab will contain all queries available at the PSAP. The queries tab will be configurable at each location to include customized searches available at that location. |
| CR | OSSDT | CT | OSSDT-SR-06-01 | The system shall support queries of supplemental data from internal systems, including: call stream data, call detail record data, and GIS. | Call Taker Helpful Links (Section 4.6) | The Queries tab will contain all queries available at the PSAP. The queries tab will be configurable at each location to include customized searches available at that location. |

| Service Area Code | Activity Code | Role | Requirement Code | Requirement Text | Document Section | Compliance |
|---|---|---|---|---|---|---|
| CR | OSSDT | CT | OSSDT-SR-06-02 | The system shall support queries of supplemental data from external systems, including: medical records data and other data sources. | Call Taker Helpful Links (Section 4.6) | The Queries tab will contain all queries available at the PSAP. The queries tab will be configurable at each location to include customized searches available at that location. |
| CR | OSSDT | CT | OSSDT-SR-06-03 | The system shall support drill-down queries of supplemental data to obtain additional detail for matched records. | Call Taker Helpful Links (Section 4.6) | The Queries tab will contain all queries available at the PSAP. The queries tab will be configurable at each location to include customized searches available at that location. |
| GV | MPGEO | CT | MPGEO-FR-04 | The system shall provide the capability to search the NG9-1-1 data repositories by the selected geometric shape. | Call Taker Helpful Links (Section 4.6) | The Queries tab will contain all queries available at the PSAP. The queries tab will be configurable at each location to include customized searches available at that location. |

## *Mapping and Multimedia Displays Requirements*

The Mapping and Multimedia displays are designed in accordance with the following requirements identified for the NG9-1-1 System.

| Service Area Code | Activity Code | Role | Requirement Code | Requirement Text | Document Section | Compliance |
|---|---|---|---|---|---|---|
| CP | ECONF | CT | ECONF-SR-09-02 | The system shall provide the capability to establish video conferencing. | Multimedia Display Section | The Video/Interactive Video Pop-Up allows to set up Video Conferencing. |
| CP | ECONF | CT | ECONF-SR-10 | The system shall provide teleconferencing features including mute based on NENA 58.001. | Multimedia Display Section | The Video/Interactive Video Pop-Up allows to set up Video Conferencing. |
| CP | ECONF | CT | ECONF-SR-09-03 | The system shall provide the capability to establish interactive text conferencing. | Multimedia Display Section | The TTY/TDD and Text Messages Pop-Up allows setting up a text conferencing session. |
| CA | MNQUE | CT | MNQUE-SR-06 | The system shall display caller location information on a map. | Map Display | |
| CA | MNQUE | CT | MNQUE-SR-06-01 | The map display shall include both raster and vector data. | Map Display | |

| Service Area Code | Activity Code | Role | Requirement Code | Requirement Text | Document Section | Compliance |
|---|---|---|---|---|---|---|
| CP | VFLOC | CT | VFLOC-SR-02-02 | The system shall provide the capability for the call taker to search for the emergency location using: a) geo-coordinates, b) civic address location, c) by clicking a location on an interactive map. | Map Display | |
| CP | VFLOC | CT | VFLOC-SR-02-04 | The system shall display location search results to the call taker. | Map Display | |
| CP | VFLOC | CT | VFLOC-SR-03 | The system shall display caller location to the call taker. | Map Display | |
| CP | VFLOC | CT | VFLOC-SR-03-01 | The system shall provide the capability to customize the display rules for caller location. | Map Display | |
| CP | VFLOC | CT | VFLOC-SR-03-02 | The system shall display caller location based upon display rules. | Map Display | |
| CP | UCLOC | CT | UCLOC-FR-06 | The system shall provide the capability to display update request results on a map. | Map Display | |
| CP | UCLOC | CT | UCLOC-FR-06-01 | The system shall notify the call taker before displaying automatic rebid requests. | Map Display | |
| GV | DSGEO | CT | DSGEO-FR-01 | The system shall provide the capability to display a map for context. | Map Display | |
| GV | MPGEO | CT | MPGEO-FR-01 | The system shall provide the capability to manipulate the map. | Map Display | |
| GV | MPGEO | CT | MPGEO-FR-02 | The system shall provide the capability to draw geometric shapes on the map. | Map Display | |
| GV | MPGEO | CT | MPGEO-FR-03 | The system shall provide the capability to draw geometric shapes on the three dimensional rendering. | Map Display | |
| GV | DSGEO | CT | DSGEO-FR-03 | The system shall provide the capability to display Emergency Location on a map. | Map Display | |

| Service Area Code | Activity Code | Role | Requirement Code | Requirement Text | Document Section | Compliance |
|---|---|---|---|---|---|---|
| GV | DSGEO | CT | DSGEO-FR-04 | The system shall provide the capability to zoom on the display. | Map Display | |
| GV | DSGEO | CT | DSGEO-FR-05 | The system shall provide the capability to pan on the display | Map Display | |
| GV | DSGEO | CT | DSGEO-FR-08 | The system shall provide the capability to select a GIS layer type for display. | Map Display | |
| CP | VFLOC | CT | VFLOC-SR-02-06 | The system shall write the emergency location to the call stream and call detail record when the call taker accepts an alternate location as the emergency location. | Map Display | |
| GV | DSGEO | CT | DSGEO-FR-02 | The system shall provide capability to display a Caller Location on a map | Map Display | |
| GV | DSGEO | CT | DSGEO-FR-09 | The system shall provide the capability to display the emergency responders associated with a Caller Location on the map. | Map Display | |
| GV | DSGEO | CT | DSGEO-FR-10 | The system shall provide the capability to display the emergency responders associated with an Emergency Location on the map. | Map Display | |
| GV | DSGEO | CT | DSGEO-SR-11 | The system shall display the emergency responders associated with a Caller Location on the map. | Map Display | |
| GV | DSGEO | CT | DSGEO-SR-12 | The system shall display the emergency responders associated with an Emergency Location on the map. | Map Display | |
| CA | MNQUE | CT | MNQUE-SR-06-02 | The map display shall include status and selected essential and supplemental data about the call, as defined in business rules. | Map Display | |

# APPENDIX E: HMI DEPLOYMENT FOR POC

This appendix presents the proposed functionality of the Human Machine Interface (HMI) display for implementation in the Next Generation 9-1-1 (NG9-1-1) Proof of Concept (POC).  The development team determined the screens and functionality that will be implemented for the POC via a thorough review of the HMI Design Document.  Development and implementation of the complete HMI design, as outlined in the HMI document, will not be possible under current time constraints and with the existing development team staff (i.e., the limited number of developers and skill sets).  Therefore, the POC HMI design will consist of selected features and functionality that are most critical in demonstrating NG9-1-1 System capabilities.  The following sections of this appendix contain a description of the HMI display sections and their respective functionality that will be demonstrated in the POC, including the HMI Main Console and information flow through the console, Caller Information section, Emergency Information section, Telephone Controls and ACD Display Section, Helpful Links Section, Multimedia Pop-Up Section 1, and the Additional Information Pop-Up Section 2.

## HMI Main Console

The Main HMI Console will be developed for the POC to demonstrate how call takers will be able to answer, respond to, and manage calls.  The Main HMI Console will be divided into four sections, as well as two areas for Pop-Up displays.  The four sections are Caller Information, Emergency Information, Telephone Controls, and Helpful Links.  The Multimedia Display (Pop-Up Section 1) will be dedicated specifically for multimedia data, including Teletypewriter/Telecommunications Device for the Deaf (TTY/TDD) and text messaging, video and interactive video, and image displays.  The Additional Information Display (Pop-Up Section 2) will be dedicated for all other supporting and supplemental data as well as call taker tools.

Incoming calls will be automatically forwarded to available call takers.  To alert the call taker of an incoming call, the call will be accompanied by an audible warning and a flashing Alert feature in the Automatic Call Distribution (ACD) display.  Upon call initiation, the Caller Information section will be pre-populated with call stream data.

During the call, the call taker can obtain support by activating features such as standard operating procedures (SOP), call scripts, Call Record, etc. to guide the interrogation of the caller and to provide the caller with specific instructions related to the emergency.  Initially, the Multimedia and the Additional Information Pop-Up sections will be unpopulated, but the call taker can view information of interest by clicking on the appropriate button, enabling the selected feature to be populated in Additional Information (Pop-Up Section 1).

The NG9-1-1 System will provide call takers with the ability to receive multimedia calls (i.e., text messages, static images, and video calls).  The HMI Main Console uses the

Multimedia section (Pop-Up Section 1) to display multimedia data associated with a call. The call taker has access to all multimedia data types simultaneously in the Multimedia section and the ability to switch between display tabs as necessary. The call taker can also activate the Additional Information display (Pop-Up Section 2) for viewing a call script or other information associated with the call.

Figure E-1 displays the initial prototype of the POC HMI.

**Figure E-1—POC HMI Prototype**
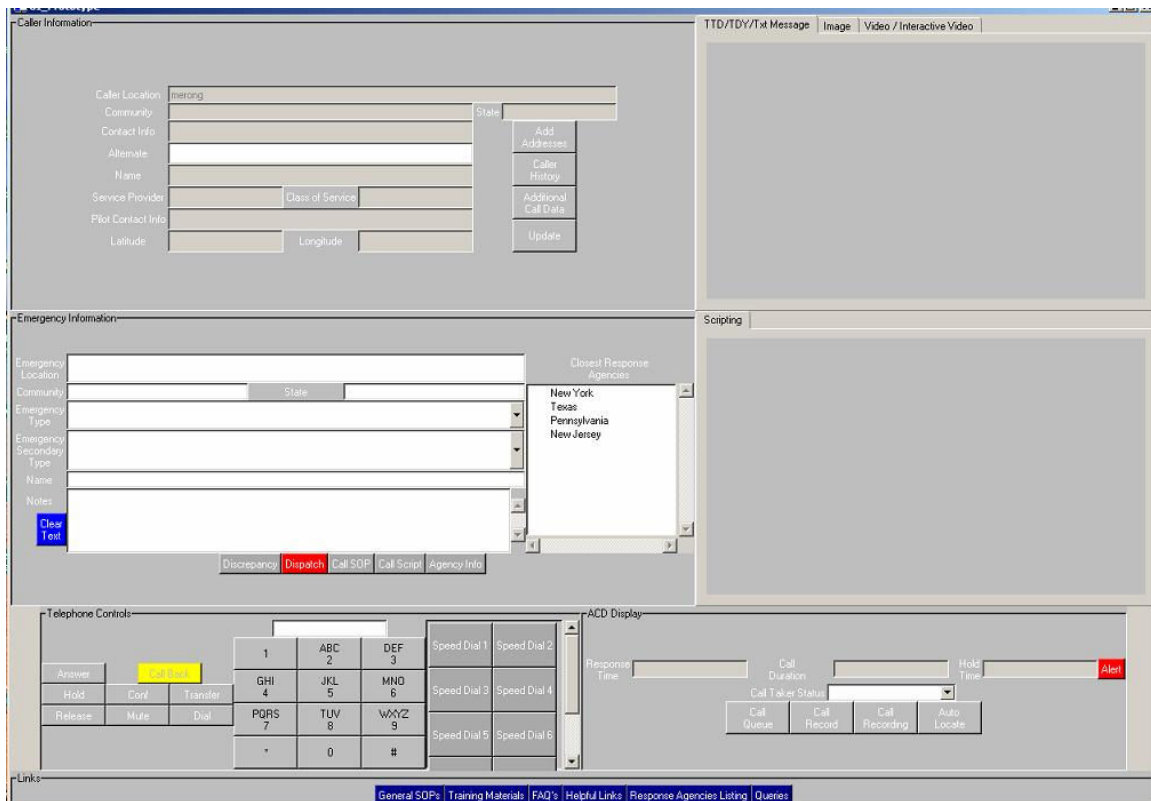


## Caller Information Section

The Caller Information sub-section will contain information about the caller, including contact and location information. This information will be populated by the NG9-1-1 System, which receives information about the call origination device from the various data and call services connected to the network. This information includes Caller Location, Community, State, Contact Information, Name associated with the call device, as well as Latitude and Longitude data. The sub-section also contains information about the Service Provider and the Class of Service for the device. The only area that the call taker will be able to edit is the Alternate field—which allows the call taker to add a new number that may be associated with the call.

Three Pop-Up screens can be accessed from the Caller Information sub-section:

- Additional Addresses
- Caller History
- Additional Call Data

**Table E-1—Caller Information Section Components**

| Pop-Up Section | Description |
|---|---|
| Additional Addresses | • The Additional Addresses Pop-Up screen contains a button to enable the call taker to add the address data to the comments of the incident record.<br>• The call taker will also be able to add an additional address to this field if there is a new address that has not been captured by this screen. |
| Caller History | • The call taker will be able to pull up detailed information (if it is available) by clicking on an incident, or by selecting the View Call Record button.<br>• The tab will contain detailed historic information about the call, allowing the call taker to drill down to the level of detail needed for a particular call. |
| Additional Call Data | • A call taker will use this screen to obtain additional information such as the severity of an impact in a vehicle crash to determine the level of response that is needed for an emergency.<br>• Other sources of additional information may include universal resource locator (URL) links to medical records, telematics, or locally stored database information.<br>• This screen will enable call takers to add information to the incident comments. |

**Emergency Information Section**

The call taker will use the Emergency Information sub-section to enter data about the emergency and to update information sent to the PSAP about the caller. The screen will also allow the call taker to view response agencies that are identified based on Emergency Type and Location. Several Pop-Up screens will be accessible from the Emergency Information sub-section, including Call SOP, Call Scripts, Agency Directory, Agency Detail, and Caller Information Discrepancy.

At the time of the call, the emergency information is populated automatically based on the caller's location information. The call taker will be able to change the location information if the emergency location is different from the one provided by the caller. The call taker will be able to enter and/or change the Emergency Type (Fire, Police, EMS) from the Emergency Type drop-down menu. The Emergency Secondary Type is a sub-menu of the Emergency Type. Based on the Emergency Type selected and the PSAP business rules, the menu changes and can also be used as a free text field.

As new information is entered into the Emergency Location field, the other fields on the Emergency Section update. The Responding Agencies Listing will automatically update based on the Emergency Type and Location entry. Based on the update to an Emergency Type entry, the Responding Agency listing may change again or a support agency may be added to the list.

The call taker will be able to enter notes about the emergency using the free-text Notes section. The notes can contain any information call takers believe is relevant to the emergency. The call taker will also be able to share information with an appropriate dispatch agency by activating the Dispatch function.

Call takers will be able to access a variety of tools and components from the Emergency Information sub-section that will enable them to manage and handle the call. Call Scripts and Call SOP Pop-Ups become available based on the entered Emergency Type. The call taker will be able to view Agency Directory and Agency Detail if additional information about the responder is needed. The selected Pop-Up populates the Additional Information display (Pop-Up Section 2).

**Table E-2—Emergency Information Section Components**

| Pop-Up Section | Description |
|---|---|
| Call SOP Pop-Up | • The call taker can activate the Call SOP by selecting the Call SOP button.<br>• The SOP will be populated based on the Emergency Type and the PSAP business rules.<br>• Call SOPs will be based on the Class of Service, the Emergency Type, Responder Agency, or other category the PSAP chooses. |
| Scripting Pop-Up | • The Script button will open the Scripting Pop-Up screen. The script will be selected and displayed based on the Emergency Type.<br>• The script can be based on PSAP-generated questions or an application programming interface (API) to a third-party dispatch protocol.<br>• Scripting tab will contain the following features:<br>  - Close Tab—Closes the scripting tab,<br>  - Add to Call Record—Adds entered information to the Call Record,<br>  - Add Text – Add responses to the scripted questions,<br>  - Clear Text—Clears the entered text from the screen. |
| Call Information Discrepancy Pop-Up | • The Discrepancy button will open the Call Information Discrepancy Pop-Up screen.<br>• The screen will be used to report discrepancies in information received from the service providers. Various items of information may be outdated such as name, address, call back numbers, etc. |

**Telephone Controls and ACD Section**

The Telephone Controls and ACD Display sub-section will allow call takers to answer, release, and transfer calls, as well view information regarding a call, including call time, duration, and time on hold. The screen will also allow call takers to manage call back and call recording procedures, and will allow call takers to view call queue and call record details.

The ACD section will allow call takers to view information regarding the call, including call time, duration, and time on hold. An Alert feature will warn the call takers of a new incoming call or indicate that the caller has been on hold for a time that is longer than acceptable. Call takers will be able to change their availability status in ACD using a

drop-down menu, as well as access the call queue, call record, and call recording Pop-Up displays.

The following Pop-Up screens will be accessed from the Telephone Controls/ACD sub-section:

- Call Back
- Call Queue
- Call Record
- Auto Locate.

**Table E-3—Telephone Controls/ACD Section Components**

| Pop-Up Section | Description |
|---|---|
| Call Back | • The Call Back Pop-Up screen will become available when the caller suddenly disconnects from the line. The call taker will be able to manually initiate a call back using the Call Back button.<br>• Because the NG9-1-1 System will be able to identify what device and communication medium was used to initiate the call, it will suggest a similar communication method for the call back.<br>• The call taker can manually change the communication method if necessary. |
| Call Queue | • The Call Queue Pop-Up screen will enable the call taker to view all calls that are in the queue.<br>• The Call Queue will be accessible from the ACD section of the Telephone Controls and ACD sub-section and will be displayed in the Additional Information Pop-Up Section 2. |
| Call Record and Call Record Query | • The Call Record and Call Record Query Pop-Up screen will contain all information about the call. The call taker will be able to access it at any time during the call from the ACD control panel.<br>• The Call Record section will contain information gathered about the call during its duration. It will be composed of four unique subsections that together provide the call taker with a holistic view of the call and its outcome. This record will be accessed for an ongoing call or from the Caller History Pop-Up screen for any previous calls received. The Call Record Pop-Up will populate the Additional Information Pop-Up Section 2.<br>• Call takers will be able to search for a call using the Call Record Search Query section at the top of the field. Once the necessary call is found, the call taker will be able to view call details by clicking on the line that contains the call summary. |
| Auto Locate | • The Auto Locate Pop-Up screen will allow the call taker to set update parameters to retrieve the caller's new location.<br>• Call takers can enter the Auto Locate button to update the caller's location. |

**Multimedia Display**

This Pop-Up is automatically activated when either of the multimedia calls is received, including static image, video, and interactive video stream and an interactive text message. If a multimedia call comes in, the appropriate Multimedia Pop-Up window

(Interactive Text Messaging and TTY/TDD, Image, and Video/Interactive Video) will activate in the Multimedia Pop-Up Section 1 of the HMI display.

**Table E-4—Multimedia Display**

| Pop-Up Section | Description |
|---|---|
| Interactive Text Messaging and TTY/TDD | • A TTY/TDD or a text message call will be processed as a form of text messaging that permits two-way conversation.<br>• The TTY/TDD Pop-Up will display the ongoing line-by-line conversation between the caller and call taker.  Separate messages will be identified with a front tag representing the caller or call taker. The Pop-Up will give the call taker the ability to scroll back in the conversation (with the up arrow in the upper right of the Pop-Up) and when applicable, forward (with the down arrow, lower right of the Pop-Up).<br>• If the call is a text message that does not include two-way conversation, the Pop-Up will display just the message. If the message length is greater than the display area, the Pop-Up will also allow the call taker to scroll up and down in the message (up/down arrows on upper/lower right side). |
| Image | • The Image Multimedia Pop-Up will be activated when an image attachment is received as part of the initiation of the call or received during call.<br>• Some image scroll features will be available to manipulate the image. |
| Video / Interactive Video | • The Video/Interactive Video Pop-Up will be activated when either a video attachment has been received as part of the initiation of the call or is received during the call from caller, or when an interactive video call has been answered by the call taker.<br>• The Video/Interactive Video Pop-Up contains buttons to play, pause, and stop the video. |

**Additional Information Display**

The Additional Information Pop-Up Section 2 will display supporting and supplementary data, as well as other tools that may be needed by the call taker during a call.  The Additional Information displays will be presented in this area via tabs.  Call takers will be able to open and close the tabs as well as navigate between the tabs during the call.
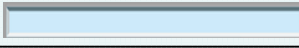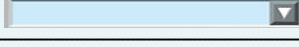
**Map Display**

The Map display will be updated when an incoming emergency call is received by the PSAP system.  The display will also be updated when a call taker enters a new/altered emergency location that is different than the location of the caller.  For the POC, Google Maps will be used to demonstrate NG9-1-1 mapping capabilities.

The Map display will contain capabilities to zoom into the map and direction make adjustments to the map by moving it to the right, left, up, or down.  The display will not contain brightness capabilities.

# APPENDIX F:    DESIGN COMPONENTS

The Human Machine Interface (HMI) display components contain a number of fields that allow call takers to manipulate system data, enter information, and submit commands. The following table contains key fields and descriptions used to illustrate the HMI components.

**Figure F-1—Design Components**

| Component | Symbol | Description |
|---|---|---|
| Free Text Field | | Allows call takers to enter text into a field. |
| Read-Only Text Field | | Displays text to the call takers.  The text can not be changed. |
| Pre-populated Text Field | | Text field is pre-populated with data.  Call takers are able to make changes to the data if necessary. |
| Drop-Down List | | Enables call takers to select a value from the list.  Drop down selections can not be changed. |
| Drop-Down Modified List | | Enables call takers to select a value from the list.  Allows call takes to enter text, if an appropriate selection is not available. |
| Standard Selection Button | Update | Enables call takers to generate standard system command.  It is denoted in gray. |
| Attention Selection Button | Clear Number    Close Tab | The buttons are denoted in either yellow, blue or red to indicate that the action may cause a permanent change, such as clear dialing number or text. |
| Consequential Selection Button | Dispatch    Call Back | The Dispatch and Call Back buttons are highlighted in green and red, to differentiate from the rest.  The Dispatch uses a green color to show that the user is going to go to a different screen, moving away from the HMI.  The Call Back is denoted in red to indicate alert and urgency to reconnect with the disconnected caller.  Both buttons activate different pop-up screens. |
| Alert Selection Button | Answer | The answer button is red to indicate urgency to respond to the caller.  The button flashes and the text changes to indicate an alert. |
| Alert Feature | | Alert feature is used to show to the user that there is a call waiting in the ACD queue.  It flashes red and the exclamation point increases in front. |
| Links Selection Button | FAQ's | The button is marked in medium blue.  It is used to open external applications of the Helpful Links section. |
| Multi-media screen / Mapping Controls | Zoom | Enables call takers to manipulate the multi-media type.  The error keys allow call takers to move the type up, down, left or right.  The zoom controls allow call takers to magnify the viewed information. |
| Brightness Controls | Brightness | Allow call takers to control the brightness of the multi-media display. |
| Volume Controls | Volume | Allow call takers to adjust the volume of the multi-media display and call recording pop-up. |